

# ENVIRONMENTAL ASSESSMENT BOARD



## ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

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VOLUME: 145

DATE: Tuesday, May 12, 1992

**BEFORE:**

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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ENVIRONMENTAL ASSESSMENT BOARD  
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,  
R.S.O. 1980, c. 140, as amended, and Regulations  
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro  
consisting of a program in respect of activities  
associated with meeting future electricity  
requirements in Ontario.

Held on the 5th Floor, 2200  
Yonge Street, Toronto, Ontario,  
Tuesday, the 12th day of May,  
1992, commencing at 9:30 a.m.

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VOLUME 145  
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B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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1 ---Upon commencing at 9:35 a.m.

2 THE REGISTRAR: Please come to order.

3 This hearing is now in session. Please be seated.

4 DAVID WHILLANS,  
5 KURT JOHANSEN,  
6 FRANK CALVIN KING,  
WILLIAM JOHN PENN,  
IAN NICHOL DALY; Resumed.

7 CROSS-EXAMINATION BY MRS. LAWSON:

8 My name is Patricia Lawson. I have lived  
9 in Port Hope all my life, and I am an intervenor with  
10 the Northumberland Environmental Protection Group.

11 Q. Is it not true that Ontario Hydro  
12 buys its fuel for its reactors from CAMECO, the  
13 facility in Port Hope?

14 MR. PENN: A. Yes, it acquires the  
15 U(3)O(8) powder that is then sintered by the fuel  
16 fabrication companies.

17 Q. I take it that Ontario Hydro has  
18 always bought its fuel from Port Hope?

19 A. The process powder, yes.

20 Q. I understand that CAMECO concluded a  
21 long-term contract with Ontario Hydro in 1991?

22 A. I'm sorry, I am not aware of that  
23 contract. You may be right, but I am not personally  
24 aware.

25 Q. It's listed in the annual report,

1 CAMECO's annual report. I wanted to ask you how long  
2 this contract was for?

3 A. Excuse me, Mr. Chairman, my  
4 microphone seems to be giving us a problem.  
5 ---Off the record discussion.

6 MRS. LAWSON: Q. The point I am trying  
7 to get at is that a long-term contract was signed in  
8 '91 with CAMECO and I want to know how long the  
9 contract was for?

10 MR. PENN: A. I'm sorry, I would have to  
11 check on that, I don't personally know. I don't know  
12 if my colleagues do.

13 Q. However, you would agree that the  
14 Port Hope refinery is a necessary stage in the  
15 production of nuclear energy?

16 A. Yes, I would.

17 Q. In fact, it could be said that  
18 Ontario Hydro depends upon CAMECO services?

19 A. Yes.

20 Q. And CAMECO certainly depends upon  
21 Ontario Hydro contracts, you would agree?

22 THE CHAIRMAN: You have got to let him  
23 answer the questions.

24 MRS. LAWSON: Okay.

25 MR. PENN: CAMECO is just one supplier.

1 Hydro is just one customer of CAMECO. CAMECO also, in  
2 my understanding, does business particularly with the  
3 United States.

4 MRS. LAWSON: Q. Yes, we know that.

5 You would agree that responsibility for  
6 deciding on more nuclear power generation must take  
7 into account the UO(2) conversion services in Port  
8 Hope?

9 MR. PENN: A. I agree that they are  
10 necessary.

11 Q. And you would agree, decisions made  
12 by this panel are to be based on all of the costs  
13 involved in the generation of nuclear power; wouldn't  
14 you?

15 A. That's our intention.

16 Q. I take it then that you would agree  
17 that the experience in Port Hope is important  
18 information to lay before this panel?

19 A. I think it is part of the fuel cycle.

20 Q. It might in fact be in the public  
21 interest to do so?

22 A. Well, part of generating electricity  
23 is in the public interest.

24 Q. Am I correct in stating that there is  
25 no documentation in the information you have provided



1 that talks about the costs entailed in operating this  
2 refinery over the last 30 years?

3 A. Well, I wouldn't agree with that.  
4 The costs I presented in my direct evidence for fuel  
5 involve all Hydro costs in acquiring part of the fuel  
6 process.

7 Q. I have just been out in the foyer  
8 there punching in CAMECO and Port Hope into this  
9 computer and there is no reference in it to evidence  
10 given by you to the problems in Port Hope?

11 A. No. Our evidence was confined to  
12 Ontario Hydro activities, not our suppliers'  
13 activities. We didn't address, for example, the  
14 business of Canadian General Electric in the fuel  
15 cycle.

16 Q. Mr. Chairman, we have just heard from  
17 Mr. Penn that Ontario Hydro depends upon CAMECO.

18 Am I to understand, because you did not  
19 refer to the costs involved in the Port Hope refinery,  
20 that you don't consider the costs of the refinery  
21 relevant to the expansion of nuclear power?

22 A. No, that's not true at all. As I  
23 said a moment ago, the fuel costs that I quoted  
24 included all components of the fuel cycle, right from  
25 the contracts we have had with the mines, with the

1 refinery, and with the people at CAMECO who process the  
2 powder and in turn with the fuel fabricator to sinter  
3 the powder to form pellets and with the fabricator who  
4 make the fuel bundles, so it's all included.

5 Q. Well, Mr. Chairman, we are going to  
6 see as I proceed if in fact what Mr. Penn has just  
7 stated is accurate.

8 THE CHAIRMAN: Just a moment. As I  
9 understand it, CAMECO is a supplier to Ontario Hydro.

10 MR. PENN: Yes, Mr. Chairman. Hydro  
11 purchases the powder from CAMECO and then provides it  
12 as a free service to the people who pelletize the  
13 powder and then fabricate the fuel.

14 THE CHAIRMAN: And Hydro pays CAMECO for  
15 providing that product?

16 MR. PENN: Yes, it does, sir.

17 THE CHAIRMAN: And Hydro is not concerned  
18 about the financial affairs of CAMECO or whether they  
19 make a profit or whether they make a loss, or anything  
20 of those things, that's not something that Hydro is  
21 concerned about; is that right?

22 MR. PENN: We would be concerned about  
23 security of supply, but we are not involved in the  
24 business dealings of CAMECO or in its response.

25 MRS. LAWSON: The issue, Mr. Chairman, is

1       whether Ontario Hydro has accurately stated, publicly  
2       stated the costs involved in operating this refinery on  
3       which they depend.

4               THE CHAIRMAN: They aren't concerned  
5       about the costs of the CAMECO refinery. What they are  
6       concerned about are the costs to Ontario Hydro. They  
7       don't care about the costs of CAMECO provided they can  
8       get the assurance of supply, that's Mr. Penn's  
9       evidence.

10              MRS. LAWSON: Mr. Chairman, you do not  
11       understand me. These are costs are borne by the  
12       Canadian taxpayer because of the generation of nuclear  
13       fuel, and I think it very important that I do lay out  
14       some of these costs before this panel.

15              THE CHAIRMAN: Well, you mustn't argue  
16       with Mr. Penn. You can ask him questions, you will get  
17       a chance later to put in your position.

18              MRS. LAWSON: Q. The panel has heard a  
19       good deal from you, the Ontario Hydro witnesses, about  
20       proposals for dealing with nuclear waste. Port Hope's  
21       experience with radioactive waste might be instructive,  
22       don't you think?

23              MR. PENN: A. Well, Ontario Hydro is  
24       ready to learn from everyone on the question of  
25       handling waste.

1                   Q. Thank you. You are aware, I'm sure,  
2                   that the Atomic Energy Control Board expressed its  
3                   concern for of the management of the Port Granby dump  
4                   in 1976. What were the concerns?

5                   A. I am afraid personally I recall the  
6                   issue that you are raising, but I don't recall the  
7                   detail of the concerns in Port Hope. I had no  
8                   responsibility or other than a of private citizens, I  
9                   had no part in that subject.

10                  Q. This, the problem at the Port Granby  
11                  dump was the result of the fuel that you bought from  
12                  CAMECO, and I would have thought that you would have  
13                  made it your concern to learn that 150 picacuries per  
14                  literature of uranium was seeping out of that dump into  
15                  Lake Ontario, that 1,715 pounds of arsenic was leaking  
16                  out that dump, and that this arsenic is still leaking  
17                  out of that dump into Lake Ontario. This was followed  
18                  after the directive given to CAMECO to be careful of  
19                  this dump site of theirs, it was followed by a  
20                  directive in 1980 to close the dump. When was the dump  
21                  finally closed?

22                  A. I'm sorry, I don't know the date.

23                  Q. It wasn't until 1988. And why did it  
24                  take so long to close down, do you think?

25                  A. I am afraid unless Mr. Johansen has

1 more details, I don't know the circumstances that  
2 CAMECO and the AECB came to that lead to the date that  
3 you mentioned.

4 Q. Well, this is very important  
5 information for Ontario Hydro because they are trying  
6 to deal with radioactive waste right now and I think  
7 it's instructive to learn from the experience that  
8 happened in my area of Ontario with this matter.

9 Would I be correct in saying that  
10 Eldorado looked at three different sites to deposits  
11 its waste after being given the directive by the Atomic  
12 Energy Control Board?

13 A. I understand they did, yes.

14 Q. What happened? Why were none of  
15 these sites put into use?

16 A. I'm sorry, Mrs. Lawson, I don't have  
17 personal details of this issue.

18 [9:50 a.m.]

19 Q. That's why we are proceeding as we  
20 are today, because I think it's important that the  
21 Panel knows this and it's not in your evidence.

22 MR. JOHANSEN: A. Mrs. Lawson, I wonder  
23 if I could just make a point.

24 Q. Yes.

25 A. The situation at Port Granby is

1 certainly a situation that we consider to be  
2 instructive, as you say. But the long-term solution is  
3 still in the works. And I have referred in my direct  
4 evidence, or at least through cross-examination, to the  
5 Federal Low Level Radioactive Waste Disposal Siting  
6 Process which was developed and which is now being  
7 implemented as the Federal Low Level Waste Management  
8 Office is seeking a site for disposal of waste from  
9 Federal agencies, including waste from the Port Hope  
10 area and other areas.

11 Q. Right.

12 A. So that is an ongoing process that we  
13 await the outcome of.

14 Q. Thank you, Mr. Johansen. I am a  
15 member of the Community Liaison Group in Port Hope that  
16 is working under the siting task force and I have been  
17 working in this area for three years with the siting  
18 task force. I am bringing up some points that we have  
19 discovered through this whole process, and I'm glad you  
20 referred to it.

21 So I would like to make that the point  
22 that experience has taught us that nuclear technical  
23 know-how may be not be acceptable to the public, and I  
24 think you all agree with that. Now, I take it you are  
25 familiar with the office of Low Level Radioactive Waste



1 Management.

2 A. Yes.

3 Q. And you would know that this agency  
4 was set up by the government to deal with the problem  
5 of historic low level waste.

6 A. Including historic waste, yes.

7 Q. Specifically historic low level  
8 waste, not ongoing low level waste.

9 A. That was the primary concern. I  
10 can't say that it's my understanding that it is  
11 exclusively for historical waste but that certainly was  
12 an important component.

13 Q. Mr. Pollock of the office of low  
14 level waste management does not consider either the  
15 Port Granby or the welcome dump sites as his  
16 responsibility. You would agree, I'm sure, that 90 per  
17 cent or more of this agency's total national  
18 responsibility lies in the Town of Port Hope.

19 A. Well, I can't agree to that figure.  
20 I can only agree that the waste at Port Hope is  
21 certainly part of the scope of that study.

22 Q. Do you know that the cost of this  
23 office, since its inception 10 years ago, equals \$27  
24 million?

25 A. I have no information about that.

1 Q. You would expect, then, wouldn't you,  
2 that with this kind of attention and this kind of money  
3 funded by the taxpayer that the problem, as you  
4 yourself say, a minimum radioactive hazard certainly in  
5 comparison to the spent fuel rods, would have been  
6 solved?

7 Are you surprised to hear that there is  
8 an estimated 235,000 cubic metres still lying in six  
9 different locations in the town I live in?

10 A. I am not surprised. We are aware of  
11 that.

12 Q. You are.

13 A. I am aware of it generally.

14 Q. I beg your pardon?

15 A. I am aware of the situation in  
16 general. I can't confirm those numbers.

17 Q. No, no. But it is important that you  
18 are aware of the problems in dealing with this kind of  
19 waste. Of course, you know about the major effort to  
20 eliminate radon gas in Port Hope homes and schools from  
21 1976 to 1981.

22 A. Yes, we are generally aware of that.

23 Q. And you would know that this  
24 responsibility was carried out by the Atomic Energy  
25 Control Board. How many homes had to have remedial

1 action?

2 A. I could not give you numbers.

3 Q. Over 400 in the town of Port Hope.

4 Where was this waste trucked to?

5 A. I don't know that specifically. But  
6 from the had context of your earlier questions, I would  
7 assume that it went to the local areas operated by  
8 CAMECO.

9 Q. Mr. Chairman, the only reason this  
10 waste could be cleaned up was that it was trucked to  
11 Chalk River. When the Chalk River site was full, then  
12 the AECB, working under MacLaren Engineering Company  
13 had to discontinue the clean-up of Port Hope.

14 How much did this cost the taxpayer of  
15 Canada, this clean-up in Port Hope?

16 A. I have no information on that.

17 Q. \$7 million. So you would agree that  
18 at least \$12 million has been spent directly in a  
19 attempt to --

20 THE CHAIRMAN: Well, he doesn't confirm  
21 those figures. If you are right, then that is what has  
22 been done, I suppose, but he can't help you on that.

23 MR. JOHANSEN: No.

24 MRS. LAWSON: The point we are making is  
25 there has been a considerable --

1 THE CHAIRMAN: Mrs. Lawson, please. You  
2 are not here to give your evidence or your argument.  
3 You are here to ask questions of Ontario Hydro. This  
4 is not the time to put your position on the record.  
5 That comes later.

6 MRS. LAWSON: I would like to ask --

7 THE CHAIRMAN: Wait a minute, please.  
8 Right now you are here just to ask questions of this  
9 panel. And if they can answer them, they will, and if  
10 they can't they won't be able to.

11 MRS. LAWSON: Q. I would like to know,  
12 to have an assurance from you that despite this money,  
13 you understand the bulk of the waste still lies in the  
14 Town of Port Hope?

15 MR. JOHANSEN: A. As I said before,  
16 that's my general understanding. And I, perhaps, can  
17 save us some questions here by saying that in general,  
18 Ontario Hydro has no involvement in this. We are  
19 certainly most interested in how that siting program  
20 unfolds because it will teach us something about the  
21 way to approach similar low level disposal facility  
22 which we are planning.

23 But really no one here on this panel  
24 certainly pretends to be an expert or to have direct  
25 involvement in that program. And what we know about it

1 is indirect information through association with AECL  
2 and the companies.

3 Q. So I'm telling you a few things you  
4 didn't really understand that might be helpful to you?

5 A. Fair enough.

6 Q. Well, would you consider a look at  
7 the radioactively contaminated Malvern subdivision  
8 pertinent to our discussion of the problems of managing  
9 the waste from nuclear facilities?

10 A. Well, it is another example of what  
11 you call historical waste, and will be included  
12 eventually in the scope of the siting study that is  
13 ongoing. I don't live very far from Malvern, so again,  
14 I have some general familiarity with that situation.

15 Q. But Mr. Johansen, the siting task  
16 force is looking to the future, it is not looking back  
17 at what has happened. And you were saying that the  
18 historic record is helpful to you. How was this  
19 problem discovered in Malvern?

20 A. Well, I guess it was discovered  
21 subsequent to the development of the Malvern  
22 neighbourhood, housing neighbourhood.

23 Q. It actually was a reporter after the  
24 houses were built on the site, who made the discovery.  
25 How was it that this problem did not come to light when

1 the Atomic Energy Control Board made a national survey  
2 of historic waste sites?

3 A. I can't answer that.

4 Q. Now, do you realize that after 12  
5 years of work and a major application on the part of  
6 the Atomic Energy Control Board and the Office of Low  
7 Level Radioactive Waste Level Management, the  
8 contaminated soil in that Malvern subdivision still  
9 remains in the backyards?

10 [10:00 a.m.]

11 A. I believe that's correct.

12 Q. What amount are we talking about?

13 A. Again, I couldn't give you specific  
14 numbers.

15 Q. How toxic is it?

16 A. Well, again, I don't have specific  
17 information on that. But my general understanding is  
18 that in the open environment it's not considered to be  
19 very toxic, perhaps --

20 Q. You might be surprised to learn that  
21 the experts consider that only 1/10th of a gram of  
22 radium is scattered throughout the whole mess.

23 What attempts have been made to engineer  
24 safe disposal of this contaminated soil?

25 A. The Malvern soil you mean?



1 Q. Yes.

2 A. To engineer disposal?

3 Q. To clean it up for the people -- it's  
4 in the backyards. Well you would know if you lived  
5 there.

6 A. Well, I don't live there. I live in  
7 the eastern part of Metropolitan Toronto, so through  
8 the media I learned about it. That's all I said.

9 I am also aware, through the media, that  
10 there was an effort to relocate that soil and that that  
11 effort, as far as I can recall, was not successful, and  
12 that the attempts were, I suppose, superseded by the  
13 plan for the low level waste disposal facility siting  
14 process development.

15 Q. The Chairman doesn't want me to tell  
16 the answer, so if it's helpful to you, I will later on.

17 But the point is, Mr. Johansen, that 12  
18 years of work and we are still at the same stage as we  
19 were when we started. I wonder what will happen when  
20 you start to transport your spent fuel rods to the  
21 Precambrian Shield?

22 A. Well, we certainly won't start  
23 transporting them until there is a place to transport  
24 them to.

25 Q. Yes. You have agreed with me that

1 the nuclear industry has caused a big mess in Port Hope  
2 and cost the taxpayer millions of hidden dollars so  
3 far.

4 A. I haven't agreed with that. I didn't  
5 say that. And if I somehow implied that in my  
6 response, it was not my intention. I don't deny that  
7 there is a large amount of material that still needs to  
8 be disposed of, but I haven't tried to characterize  
9 that as a major hazard in terms of toxicity or volume  
10 or whatever.

11 It's a significant challenge and there is  
12 a process under way that I am aware of to resolve it..  
13 And as I said also, we are very interested in seeing  
14 how that process unfolds.

15 Q. So I am to understand then that what  
16 I am doing right now is helpful to you.

17 A. Yes. But I would also say that we  
18 are in contact with the low level radioactive waste  
19 management office. And the fact that I don't have  
20 facts at my finger tips shouldn't be taken to mean that  
21 Ontario Hydro does not have familiarity with that  
22 project and does not have a lot of information about  
23 it.

24 Q. So, Mr. Johansen, you would agree --

25 MS. HARVIE: If I may just interrupt at

1       this point, Mrs. Lawson.

2                       I am not sure that the objective is  
3       really to be helpful to the witnesses but to be helpful  
4       to the Board. And to the extent that the witness is  
5       giving evidence about what he has read in the newspaper  
6       about a subdivision in Malvern is not evidence that  
7       will assist the Board. It doesn't have a lot of  
8       weight, so I ask you to bear that in mind.

9                       MRS. LAWSON: I would like to respond to  
10      that.

11                      The point being made is about the  
12      problems and the costs involved in nuclear waste and  
13      the regulation of nuclear waste. That's what is my  
14      intention.

15                      You have told us that Canadians --

16                      THE CHAIRMAN: I don't think there is any  
17      doubt about the relevance of the issue. The difficulty  
18      is that the lack of knowledge of the members of the  
19      panel on the matters in which you are addressing.

20                      MRS. LAWSON: I will try to stick to  
21      points that I would expect the panel members to have  
22      some familiarity with.

23                      Q. You have told us that Canadians need  
24      not worry for their health or safety because the  
25      nuclear industry is tightly regulated. You also agreed

1 with me, I take it --

2 MR. JOHANSEN: A. Could I respond to  
3 that first point? Was that a question?

4 Q. Yes, it was a question.

5 A. Well, I would agree with the latter  
6 part that it is tightly regulated. I guess the first  
7 part which I believe had to do with low hazard, perhaps  
8 you could refresh my memory of the first part of your  
9 question or statement.

10 Q. My question was, that you have told  
11 this Panel that Canadians need not worry for their  
12 health or safety because the nuclear industry is  
13 tightly regulated?

14 A. Well, with regards to the first part  
15 of your statement then, I don't think we have put it in  
16 quite that way, but it would follow that our practice  
17 of operating our facilities, Ontario Hydro's facilities  
18 in such a way that the emissions to the environment are  
19 typically less than 1 per cent of the regulatory limit,  
20 that that could be taken to mean that there is not a  
21 significant hazard.

22 Q. And you agree that waste is  
23 considered an emission to the environment?

24 A. Not if it's being contained in an  
25 engineered facility.

1 Q. But you have also agreed that CAMECO  
2 is the only refinery in Canada.

3 A. I believe -- in Blind River you said?

4 Q. No, I said CAMECO. You are quite  
5 right, Mr. Johansen, now there is a refinery in Blind  
6 River and the correct term is a conversion service now  
7 in Port Hope. But since it was founded in 1930  
8 Eldorado/CAMECO has been the supplier of the fuel for  
9 the nuclear generating plants.

10 A. Well, just to be clear, the refining  
11 and conversion facilities that Ontario Hydro does  
12 business with are the CAMECO refinery facilities in  
13 Blind River, and the conversion facilities of CAMECO  
14 also in Port Hope.

15 Q. And before, I think it was about 10  
16 years ago, was when the Blind River plant was built.  
17 So before that time when the Bruce and the Pickering  
18 were going, you bought the whole -- it was the refinery  
19 in Port Hope that you bought your fuel from?

20 A. That may be true. I don't happen  
21 recall that for a fact.

22 Q. So the point is that we rest assured  
23 from your evidence that there is a tight regulator, we  
24 know that the nature of refinery has been and is in  
25 Port Hope. Why where the wastes allowed to be dumped

1 throughout this town? Where was the regulation?

2 A. I can't answer that. That is a  
3 matter of record. I believe AECEB has spoken and  
4 responded to that question, for example, through the  
5 federal environmental assessment process into the  
6 expansion proposed at Port Hope and Port Granby.

7 Q. Is it not reasonable to conclude from  
8 this situation that human error is possible in the  
9 handling of toxics? Perhaps the cost is too high given  
10 that the contamination is on the scale of hundreds and  
11 thousands of years?

12 A. I think there were two questions  
13 there. The first question dealing with again the  
14 tightness of regulation, I could agree about that. And  
15 the second part is your statement that given the length  
16 of the period of potential hazard is great, that  
17 therefore we were somehow underestimating the cost; is  
18 that what you are asking?

19 Q. Yes, I am.

20 A. Well, in earlier testimony I  
21 attempted to explain the basis for our confidence in  
22 the geologic disposal concept, and Mr. Penn provided  
23 evidence on the costs estimated for the disposal  
24 facility to the extent that that disposal facility,  
25 federal facility, would have to accommodate fuel from



1 Ontario Hydro.

2 I believe he indicated that those  
3 estimates were of a conservative nature based on a  
4 conceptual design which has not yet been optimized and  
5 that there is some, apart from the contingency factor  
6 which he also talked about, there is some expectation  
7 that the optimization process subsequent to the  
8 government acceptance of the concept, if that is the  
9 result, that optimization process might indeed lead to  
10 a more efficient design which might indeed be cheaper.

11 I am not sure if that quite answers your  
12 question, but that's what I interpreted your question  
13 to be.

14 Q. I would just like to get back to the  
15 point in the face of nuclear waste which is the  
16 possibility of human error--

17 A. Oh, human error, yes.

18 Q. --as we have seen.

19 I gather then that you would not agree  
20 with me that the most prudent action now is not to  
21 produce any more wastes, at least certainly not to  
22 produce any more nuclear waste until we have safely  
23 disposed of the collection of wastes we still have?

24 A. No, I don't agree with that. I have  
25 indicated that a plan is in place, technology has been

1 developed, there is confidence --

2 Q. We have to agree to disagree on that,  
3 I think.

4 A. I am not here to argue with you, Mrs.  
5 Lawson.

6 Q. No, I know.

7 A. I am simply trying to answer your  
8 question.

9 Q. Right.

10 A. There is a certain amount of used  
11 fuel and other radioactive active materials already  
12 that have to be managed and disposed of eventually  
13 whether we ever build another reactor or not. And I  
14 believe the consensus of the federal government  
15 departments whose responsibility it is to administer  
16 the nuclear program, and the regulators, and Ontario  
17 Hydro, and I suppose even the provincial government of  
18 Ontario, in the past at least at the time of the Porter  
19 Commission, all agreed that there was no need to put  
20 nuclear generation on hold pending a resolution of the  
21 waste disposal question.

22 Q. I am glad you brought up the Porter  
23 Commission because what I want to talk about very  
24 briefly or ask questions about is what has happened  
25 since the Porter Commission. I am familiar with what

1 happened, the decision and all the intervention during  
2 the Porter Commission.

3 You said that you are familiar with  
4 CAMECO's waste dumps as Port Granby and Welcome. Did  
5 you know --

6 MS. HARVIE: I don't think he actually  
7 said that. He said he only had some passing  
8 familiarity with it.

9 MRS. LAWSON: Yes. I am not going to  
10 take up the time with any detailed information. I want  
11 to make a point here.

12 Q. Did you know that the Town of  
13 Newcastle has taken a position that the Port Granby  
14 dump must be dug up and moved away from Lake Ontario?

15 MR. JOHANSEN: A. I may have read  
16 something about that, but I don't recall any specifics.

17 Q. What was the liability limit imposed  
18 on CAMECO for clean up of these dumps when the Crown  
19 sold Eldorado two years ago?

20 A. I don't know that.

21 Q. Twenty-five million.

22 What is the estimated cost for a properly  
23 engineered waste management facility as delineated by  
24 the siting task force that you referred to two to three  
25 years ago? You might know that.

1                   A. I might, but I don't happen to recall  
2                   it. I certainly have the report.

3                   Q. In the task force, this document --  
4                   THE CHAIRMAN: Just as moment, let him  
5                   finish. I don't think he finished.

6                   MR. JOHANSEN: I have the report but it  
7                   isn't something that I carry around in my head.

8                   MRS. LAWSON: Q. No, no.

9                   MR. JOHANSEN: A. It's not a cost that  
10                  Ontario Hydro has to account for, so it's a piece of  
11                  information that I picked up somewhere but we don't  
12                  need to do anything with it.

13                 [10:15 a.m.]

14                  Q. The only point I want to make, and I  
15                  wouldn't expect you to have to know it, is that the  
16                  estimated cost delineated in here is 16 times the 25  
17                  million liability limit imposed on CAMECO. The point I  
18                  want to know is who do you think will pay for this?

19                  A. Well, I, again, can't speak for the  
20                  funding principles of agencies other than Ontario  
21                  Hydro. As Mr. Penn has indicated and I have eluded to,  
22                  it's Ontario Hydro's principle that the cost of the  
23                  management of used fuel and other radioactive materials  
24                  should be born by the beneficiaries, essentially.

25                  Q. So you are talking about the

1 taxpayer?

2 A. The consumers.

3 Q. The consumers. So you are saying the  
4 Canadian taxpayer will pay for this?

5 A. I am not saying that.

6 THE CHAIRMAN: Excuse me, I think he may  
7 be saying Ontario Hydro's rate payers. Isn't that what  
8 you are saying?

9 MR. JOHANSEN: Ontario Hydro's rate  
10 payers in the case of the cost of facilities that  
11 Ontario Hydro is accountable for.

12 MRS. LAWSON: Thank you, Mr. Chairman.

13 Q. So do you think that the Canadian  
14 public is going to want any kind of energy that entails  
15 such a long lasting expense?

16 MR. JOHANSEN: A. Well, I can't speak  
17 for every member of the Canadian public. But if  
18 opinion polls mean anything, there is certainly no  
19 indication that the Canadian public as a whole is  
20 saying no more nuclear energy.

21 Q. Thanks. You have stated that the  
22 nuclear industry, as we have discussed, is well  
23 regulated by the Atomic Energy Control Board. Did you  
24 realize that this agency approved one of the world's  
25 largest UF(6) conversion plants in 1983 on the Port

1 Hope Harbour on Lake Ontario.

2 A. Yes. Again, that's information that  
3 I was aware of but it's not a facility that's used to  
4 produce products for Ontario Hydro. That's for export.

5 Q. Right. Did you know that this  
6 approval was given with no environmental hearing, no  
7 licensed waste facility for the ongoing waste for that  
8 plant, no secondary containment, and that the cooling  
9 water outflow flows right into Lake Ontario?

10 MS. HARVIE: Mr. Chairman, these  
11 witnesses really cannot speak to the activities of a  
12 third party, including a regulator, aside from its  
13 dealing with Ontario Hydro.

14 THE CHAIRMAN: I think Ms. Harvie is  
15 right about that. This is really nothing to do with  
16 Ontario Hydro.

17 MRS. LAWSON: Mr. Chairman --

18 THE CHAIRMAN: I mean, I'm not saying it  
19 has nothing to do with the issue that we have to deal  
20 with. It's nothing that they have any knowledge that  
21 they can help us with. The people who will know the  
22 answer to that are the CAMECO people and the AECB.

23 MS. HARVIE: I might add as well that  
24 CAMECO, I think, is a part-time party in these  
25 proceedings.



1 MRS. LAWSON: Q. The only issue here is  
2 that I have heard Ontario Hydro lay before this panel  
3 their conviction that the Atomic Energy Control Board  
4 can be relied upon to protect the health and safety of  
5 the people of Canada because they will regulate the  
6 nuclear industry.

7 THE CHAIRMAN: Excuse me, Mrs. Lawson.  
8 With respect to Hydro's operations is the extent of  
9 that evidence.

10 MRS. LAWSON: See, I also thought I made  
11 it clear that Hydro's operations depend upon the Port  
12 Hope plant.

13 THE CHAIRMAN: Well, that may be. What  
14 the AECB controls is Hydro's generational activities  
15 and waste disposal activities. That's what the AECB  
16 does, as far as Hydro is concerned, and that's what  
17 their evidence deals with as far as the extent and the  
18 viability of the AECB control.

19 MRS. LAWSON: The concern is the waste.

20 THE CHAIRMAN: Well, I understand the  
21 concern. I don't have any quarrel with you about the  
22 concern. The concern is a genuine concern. I have no  
23 trouble about with that. It's just that these  
24 particular witness can only help you to a limited  
25 extent, and that when we are dealing with other parties

1 that they have no control or supervision over.

2 MRS. LAWSON: I felt it was important  
3 that I tell Mr. Johansen areas that this regulator had  
4 not protected the people of Port Hope. Because he  
5 thinks it will protect the nuclear industry.

6 And I am trying to make the point that  
7 the regulator allowed this facility to be built in this  
8 town sandwiched between the harbour and the main  
9 railway lines and 30 metres from the main CNR tracks.

10 THE CHAIRMAN: That may be. But that's  
11 for another day, Mrs. Lawson, that kind of evidence.

12 MRS. LAWSON: Yes. Well, I wonder why  
13 the legally allowed limit of uranium dust and fluorides  
14 emitted from the stacks of this facility is ten times  
15 the legally allowed limits at Pickering?

16 THE CHAIRMAN: Well, this is not  
17 something within these witnesses area of  
18 cross-examination. If they happen to know and if they  
19 want to volunteer the answer, that, of course is up to  
20 them.

21 MRS. LAWSON: You see, Ms. Harvie said  
22 that the point is to lay the information before the  
23 Panel, and that's what I'm trying to do since it hasn't  
24 been laid before the Panel.

25 THE CHAIRMAN: But this is not the time

1 for you to do it. That's the point I am trying to  
2 make.

3 MRS. LAWSON: Well, I will get on to  
4 questions about the siting task force, which Mr.  
5 Johansen is familiar with.

6 Q. You have told us that you are aware  
7 that the siting task force was set up four or five  
8 years ago to try to resolve the mistrust and hostility  
9 of the public toward the waste producers and also the  
10 regulatory agency. And I won't take up your time --

11 MR. JOHANSEN: A. Well, I didn't say  
12 that.

13 Q. I beg your pardon?

14 A. I didn't say that.

15 Q. Well, this is the document of the  
16 siting task force, and in it states:

17 For the most part the challenge in  
18 effective radioactive waste management  
19 lies not so much in resolving technical  
20 concerns as it does in countering public  
21 apprehension about the radioactivity and  
22 the effectiveness of current approaches  
23 to the regulation and management of  
24 radioactive waste disposal and storage  
25 facilities.

1                   A. Well, that's what it says. And I can  
2                   acknowledge that the siting process task force, it was  
3                   a task force to come up with a siting process.

4                   Q. Right.

5                   A    The actual siting program is only now  
6                   under way. I can acknowledge that a very important  
7                   part of the process that was recommend by that task  
8                   force was a way of dealing with public concerns,  
9                   whatever those concerns were based on.

10                  Q. It's not only an important part of  
11                  it, Mr. Johansen, it is the process. The process is  
12                  the public involvement.

13                  A. Well, I have to disagree with you a  
14                  little bit here, but this isn't point of argument.

15                  Q. No.

16                  A. I think it's important to note that  
17                  whilst there was emphasis in the task force report on  
18                  dealing with public concerns, at the base of it all  
19                  remained a requirement that the technical criteria for  
20                  siting not be overlooked and that has to be there, as  
21                  well.

22                  Q. Of course. I am now a member of the  
23                  group looking at the technical requirements for  
24                  locating a facility in the Town of Port Hope. I am  
25                  totally aware of that. The point which I think we

1 haven't clarified is that the process allows the public  
2 to say no at any stage up to the fifth stage. We are  
3 now into stage four of this process.

4 So once we have received all the  
5 technical information about whether it's  
6 environmentally appropriate to site the volume of waste  
7 that need to be safely engineered within the  
8 Municipality of Port Hope, the publicly appointed group  
9 can then say no, they don't agree with it and then opt  
10 out. Now, the point I'm trying to make is, how far in  
11 the process are we now and --

12 A. I don't know that.

13 Q. No. Well, how many communities have  
14 decided to continue into phase four, which is the  
15 technical assessment of this process?

16 A. Again, I can't speak to the detailed  
17 status of that program.

18 Q. But since you do know about this  
19 siting process, which is the government's way of trying  
20 to deal with this low level radioactive waste problem,  
21 you do know that the siting task force sent a letter to  
22 every municipality in the Province of Ontario asking  
23 them if they would like to be a host community for  
24 these wastes.

25 A. They approached a lot of communities.

1 Q. That's right.

2 A. Exactly how many, I'm not sure. But  
3 it was a lot.

4 Q. So, you do know that it was filtered  
5 down from about 30 responses to about 15 or 16  
6 communities who then continued through phases one, two,  
7 and three of the process. And my question is, out of  
8 those 15, how many communities are now involved in the  
9 technical assessment?

10 A. I don't know that.

11 Q. Well, would you like to know?

12 A. Well, I have ways of finding that  
13 out.

14 Q. You don't want to hear it from me,  
15 okay.

16 A. Well, it's not that. But I think we  
17 have --

18 Q. Yes, sure. I don't want to take up  
19 the time on something that's important.

20 A. If you think that I have information  
21 pertaining to Ontario Hydro's role in radioactive  
22 materials management and you would like that  
23 information, then I would be glad to provide you with  
24 that.

25 Q. Well, what I am providing you with is



1 the public perception of radioactive waste, you know.  
2 That's going to be helpful for you when you are having  
3 to deal with your fuel rods.

4 So the three host communities, along with  
5 the other three that are left out of this process, are  
6 now into phase four. What has been the cost to the  
7 Canadian taxpayer to date from this siting process?

8 A. I have no idea.

9 Q. Do you want me to tell you that or  
10 will you look it up yourself?

11 A. Well, if I need to look it up, I  
12 will.

13 Q. But you see, Ms. Harvie wants me to  
14 focus on helping the panel to understand the problem,  
15 and I think the Panel needs to know that this one  
16 government agency has spent \$16 million. And would you  
17 say it was quite feasible, Mr. Johansen, that these  
18 communities might all say they don't want it?.

19 THE CHAIRMAN: Excuse me. Ms. Harvie is  
20 on her feet. Really you are not here to give evidence,  
21 Mrs. Lawson. And you can suggest answers to the  
22 witnesses, but you are not here to give evidence. This  
23 is not the time for that.

24 MRS. LAWSON: No, no, so I'll go on to  
25 another topic.

1 Q. Of course, you are familiar with the  
2 International Joint Commission on the Great Lakes.

3 MR. JOHANSEN: A. Yes, I am.

4 Q. You know, then, that this Commission  
5 has located 42 areas of concern for immediate remedial  
6 action; this is both sides of the border, like, U.S.A.  
7 and Canada.

8 A. I know that they issue a report  
9 roughly once a year. They may report more frequently  
10 than once a year if circumstances warrant it. And each  
11 year they have a listing of so-called hot spots or  
12 areas of concern that they feel need to be brought to  
13 the attention of the various authorities for further  
14 research or remedial action.

15 Q. Does the Chairman want me to correct  
16 Mr. Johansen if he's not quite accurate?

17 THE CHAIRMAN: You can suggest to him  
18 what the accurate answer is and he can either agree or  
19 disagree.

20 MRS. LAWSON: Q. Mr. Johansen, since at  
21 least 10 years ago, there have been 42 sites, the same  
22 sites have been labelled as the most contaminated  
23 around the Great Lakes Basin and it stays the same 42.  
24 And how many of these are in Canada?

25 [10:30 a.m.]

1 THE CHAIRMAN: You will have to ask him  
2 whether he agrees with that 42 statement or not, or  
3 whether he has no knowledge of it.

4 MR. JOHANSEN: I can't say that they  
5 have -- you may be it quite right that the 42 have  
6 stayed the same year-after-year.

7 MRS. LAWSON: Q. I see.

8 MR. JOHANSEN: A. I have no reason to  
9 disagree with that.

10 Q. But you could the international joint  
11 commission that and check up on it.

12 A. Certainly. And we get the reports  
13 each year.

14 Q. And how many of these are in Canada?

15 A. Off the top of my head I couldn't  
16 say, but there are several.

17 Q. It would be helpful to know that 17  
18 of these 42 are in Canada.

19 And would you be surprised to hear that  
20 most unfortunately the Port Hope Harbour is one of  
21 these 17 sites?

22 A. I am not surprised, I know that.

23 Q. Do you know the organizational  
24 structure that the government of Canada has set up to  
25 clean up -- do you know the name of the organizational

1 structure that the government of Canada has set up to  
2 clean up this important feature of our town?

3 A. It doesn't come to mind, I probably  
4 heard it. But no, I can't say.

5 Q. It might be helpful, because I think  
6 there might be somebody here that would recognize that  
7 it is called the Remedial Action Plan.

8 A. Well, that is a generic name that is  
9 given to virtually every plan to remedy the situations  
10 identified by the IJC.

11 Q. Mr. Johansen, I have here a list of  
12 20 documents. I take it you are familiar with these  
13 body of research done by Environment Canada on the Port  
14 Hope Harbour?

15 A. Not necessarily.

16 THE CHAIRMAN: Have you got the list?

17 MR. JOHANSEN: No, I don't have a list.  
18 I may be familiar with some of it.

19 MRS. LAWSON: Mr. Chairman, if I read out  
20 the names of one or two --

21 THE CHAIRMAN: Perhaps you could show him  
22 the list and he can say whether he knows anything about  
23 them or not.

24 MRS. LAWSON: Would it be best to show  
25 them?

1 I don't want to take up time so I thought  
2 I would just read out maybe three or four names if  
3 would be helpful.

4 THE CHAIRMAN: All right.

5 MRS. LAWSON: Q. Then it would help you  
6 to understand the situation in our harbour.

7 The Assessment of Environmental Impact of  
8 Port Hope's Harbour Radioactively Contaminated  
9 Sediments, September 1981, done by Dr. Ray Durham of  
10 the National Water Research Institute.

11 A Discussion of Environment Canada  
12 Investigation --

13 THE CHAIRMAN: Are you asking him a  
14 question, if he is familiar with that report? Is that  
15 what you want to know?

16 MRS. LAWSON: No, I am reading maybe  
17 three or four names.

18 THE CHAIRMAN: Then what question are you  
19 going to ask him after you have read the names?

20 MRS. LAWSON: The question is, was he  
21 familiar with these documents.

22 THE CHAIRMAN: All right. Are you  
23 familiar with that document?

24 MR. JOHANSEN: That doesn't ring a bell.

25 MRS. LAWSON: I would like to ask him

1 about this document, Mr. Chairman.

2 THE CHAIRMAN: Go ahead.

3 MRS. LAWSON: Q. A discussion of  
4 Environment Canada Investigation into Radionuclide  
5 Levels in Fish Collected from Port Hope Harbour,  
6 December 1986?

7 MR. JOHANSEN: A. I have no knowledge of  
8 that. That would be a very site-specific study  
9 obviously.

10 Q. Yes. You can imagine how the  
11 fisherman and the people of Port Hope, what they think  
12 of this.

13 The Benthological Chemical Radiological  
14 and Chronological Evaluation of Sediments in the Port  
15 Hope Harbour, August 1985, Beak Consultants?

16 A. That rings a bell.

17 I might just say in general comment,  
18 these all sound like the sort of studies that would  
19 normally be carried out to properly assess the impact  
20 of the present situation and what needs to be done  
21 about it.

22 MRS. LAWSON: Yes. Perhaps I will type  
23 it up and give it to Mr. Johansen. Do you think that's  
24 the best way of doing it?

25 THE CHAIRMAN: All right.



1 MRS. LAWSON: Q. Twenty documents  
2 represents a fair commitment of time, expertise and  
3 money since 1978, wouldn't you agree?

4 MR. JOHANSEN: A. I would generally  
5 agree, yes.

6 Q. And you have realized, haven't you,  
7 that the highly toxic radioactive mess still remains  
8 under six feet of water in the Port Hope turning basin?

9 THE CHAIRMAN: He is not prepared to say  
10 it's a mess. He is prepared to say there is a  
11 substantial amount. I think that's what he said.

12 MR. JOHANSEN: Yes, Mr. Chairman.

13 MRS. LAWSON: I am trying to point out,  
14 Mr. Chairman, that there is six feet of water on top of  
15 it.

16 THE CHAIRMAN: I think he has answered  
17 that question.

18 MR. JOHANSEN: Yes, I believe I have.

19 MRS. LAWSON: But not about the turning  
20 basin.

21 THE CHAIRMAN: That's really way out of  
22 his area. That's very site-specific and I stop other  
23 people when they are getting into site-specific areas.

24 MRS. LAWSON: Right.

25 MR. JOHANSEN: Mrs. Lawson, I could say

1 in general with regards to the whole of Port Hope  
2 situation, it's an example of an area where I have a  
3 personal interest because of the line of work that I am  
4 in. The involvement or information that I obtained  
5 about it, however, is generally only because I have  
6 that personal interest; it's not because it is  
7 important to what I do for Ontario Hydro.

8 Although certainly the outcome of the  
9 siting task force program we expect will be instructive  
10 and it will be reviewed through the federal  
11 environmental assessment process into the disposal  
12 concept.

13 So that is where we expect we will see  
14 some kind of summary documentation of that process.

15 MRS. LAWSON: Q. And I am sure you  
16 recognize, Mr. Johansen, that the point I am making is  
17 that if we had had no nuclear generating stations we  
18 would have had no mess and that we are still trying to  
19 deal with this mess.

20 I would like to just mention the Ministry  
21 of the Environment. How long would you guess the  
22 Ministry of the Environment has been involved in the  
23 Port Hope problem? Just take a guess.

24 MR. JOHANSEN: A. I would hesitate to  
25 guess. I don't think a guess is of any use to the

1 Board.

2 The Ministry of the Environment, I guess,  
3 was an incidental party that got involved. I am not  
4 sure that they saw themselves as having a  
5 responsibility to begin with.

6 Q. Well, you are quite right, really,  
7 what authority does the province have over this  
8 facility?

9 A. Well, they are not the licensing  
10 authority, however they do administer environmental  
11 protection legislation that would apply. And I know  
12 they were involved as participants in some way in the  
13 federal environmental assessment review process that  
14 addressed the proposed project expansion at Port Hope  
15 or Port Granby, both I guess.

16 Q. So, Mr. Johansen, I take it that you  
17 would agree with me then that we have one branch of  
18 government responsible for the day-by-day monitoring of  
19 these problems, but with no authority to make any  
20 decisions?

21 THE CHAIRMAN: Well, this is really a  
22 legal question. I am not sure that Mr. Johansen can  
23 answer that.

24 MRS. LAWSON: All right.

25 Q. I take it that one branch of the

1 Ministry of the Environment known as the  
2 PhytoToxicology Branch is known to you because of the  
3 work they have done in Port Hope?

4 MR. JOHANSEN: A. Not because of the  
5 work they have done in Port Hope, but because of the  
6 involvement that we have had with them over the years  
7 in the area of air pollution control and so on.

8 Q. Good. Now, would you be surprised to  
9 hear that out their total workload in the province of  
10 Ontario, 5/6th's of the province gets less attention  
11 than Port Hope?

12 MS. HARVIE: Well, this goes back to the  
13 comment that I made earlier about these witnesses  
14 really not being able to speak to the activities of a  
15 third party or an agency.

16 MRS. LAWSON: Q. I wonder if it would be  
17 helpful to you if I just read the first few lines of  
18 the Assessment of Human Health Risk Report, Soil Levels  
19 of Metals and Radionuclides in Port Hope, why this was  
20 at some expense to the taxpayer, you would agree  
21 wouldn't you, why this had to be all compiled?

22 MR. JOHANSEN: A. Yes. I am not  
23 questioning or surprised that it was done.

24 Q. No. But you see, I am not surprised  
25 that you don't know about it and that's why I have made

1 all the trouble to come today to tell you.

2 MS. HARVIE: If I may just suggest at  
3 this point, Mr. Chairman, that Mrs. Lawson, this is the  
4 purpose of your own evidence. It's to just ask these  
5 witnesses questions and then if you have got facts that  
6 you want to put before the Board you produce a witness.

7 MRS. LAWSON: But at this point in time  
8 would you rather I left this? Or I think now that we  
9 have focused on Port Hope, the panel would like me to  
10 just finish up. I am only here for one or two more. I  
11 don't want to take up anymore time.

12 THE CHAIRMAN: Fine.

13 MRS. LAWSON: Okay.

14 THE CHAIRMAN: What is the document you  
15 are reading from?

16 MRS. LAWSON: It's called the Assessment  
17 of Human Health Risk of Reported Soil Levels of Metals  
18 and Radionuclides in Port Hope. This was published  
19 last November, 1991, by the Ministry of the  
20 Environment.

21 THE CHAIRMAN: By the Ontario Ministry of  
22 the Environment?

23 MRS. LAWSON: Yes.

24 Q. I am making the point that there are  
25 major hidden costs because of the production and

1 generation of nuclear power.

2 This scientific document represents an  
3 assessment of potential exposure and  
4 environmental health risk associated with  
5 elevated levels of 11 metals and three  
6 radionuclides in soil. The substances  
7 assessed are listed in the table below.

8 The specific siting question is the  
9 area surrounding the Eldorado Resources  
10 Limited/CAMECO facility in the Town of  
11 Port Hope. The assessment was developed  
12 because the reported levels of a number  
13 of metals exceeded the Ministry of the  
14 Environment's upper limit of normal  
15 guidelines.

16 The survey identified three  
17 radionuclides - which you would know  
18 about, it gives of the scientific names -  
19 as consistently exceeding reported  
20 background levels.

21  
22 So it took them about three years to get  
23 this whole thing all through their various bureaucratic  
24 parts of their government because it had to be assessed  
25 by a lot of different branches. It's now there if you



1 want to see it. I won't take up anymore time on that.

2 MS. HARVIE: Maybe we could have an  
3 exhibit number assigned to that, if you would like to  
4 have it filed on the record.

5 MRS. LAWSON: Only if it helps Mr.  
6 Johansen and the Panel.

7 THE CHAIRMAN: As it's been referred to  
8 perhaps it should be given an exhibit number.

9 MRS. LAWSON: But I also have these other  
10 ones too, and the annual report of CAMECO.

11 THE CHAIRMAN: We don't need the annual  
12 report of CAMECO, but we can perhaps put the last  
13 document.

14 THE REGISTRAR: 673, Mr. Chairman.

15 MS. HARVIE: We can get additional copies  
16 made.

17 MRS. LAWSON: Sure, you can, they have  
18 lots.

19 ---EXHIBIT NO. 673: Assessment of Human Health Risk of  
20 Reported Soil Levels of Metals and  
21 Radionuclides in Port Hope, published  
November, 1991, Ministry of the  
Environment.

22 MRS. LAWSON: Q. Now, Mr. Johansen, you  
23 might be more familiar with some of the unusual  
24 occurrences impacting upon the safety and health of the  
25 citizens of this town as well as their environment.

1 I want to ask you, do the citizens always  
2 know when these accidents happen from the plant, that  
3 as I told you there is no buffer zone, it lies straight  
4 in their midst?

5 THE CHAIRMAN: What plant are you  
6 referring to?

7 MRS. LAWSON: The plant I am referring to  
8 is Eldorado, it used to be called Eldorado.

9 THE CHAIRMAN: But they don't know  
10 anything about the Eldorado plant or how it operates or  
11 what happens there. They have made that very clear.

12 MRS. LAWSON: Okay.

13 Q. I think it's important, Mr. Johansen,  
14 as you consider all aspects of the problems of nuclear  
15 waste disposal, to understand the problem of the sewage  
16 sludge in Port Hope. Did you know that the premier of  
17 this province, the then premier, forbade the Town of  
18 Port Hope from allowing its sewage sludge to be spread  
19 on farmers' field?

20 MR. JOHANSEN: A. Well, again, that is  
21 not necessarily connected with what we have been  
22 talking about, the land disposal, as it is generally  
23 referred to, of sewage is not something which is  
24 allowed to be done in an unregulated manner because of  
25 heavy metal concerns. That would apply anywhere in the

1 province.

2 Q. Is there any other town on this  
3 continent for which the sewage sludge is not allowed to  
4 be put on the fields? You wouldn't know that, I am  
5 sure.

6 THE CHAIRMAN: Well then, don't ask him.

7 MRS. LAWSON: No, I know.

8 But the point is that, Mr. Johansen, is  
9 not accurate. The common practice is that the Ministry  
10 of the Environment oversees the spreading of the sewage  
11 sludge.

12 Now, Mr. Chairman, this is relevant  
13 because it would --

14 THE CHAIRMAN: I am not quarreling with  
15 the possibility that a lot of what you have been saying  
16 is relevant, it is just that this is not the time for  
17 you to be presenting this.

18 MRS. LAWSON: I am just finished, so I  
19 will finish up.

20 Q. I would like to read from the Evening  
21 Guide of last week, just because it summarizes the  
22 problem.

23 Our sewage sludge stays and stays and  
24 stays. It's been piling up now since  
25 1985 when the Ontario Environment

1 Ministry ordered the town to stop  
2 allowing it to be spread because it's  
3 radioactive. CAMECO, the usual suspect  
4 in these cases, has been permitted to  
5 pump its waste into the sewer system, and  
6 since its waste contains radioactive  
7 materials, so does the town sludge. What  
8 is being done about it? Nothing much.  
9 Now what I want to ask you is: Where was  
10 the regulatory agency --

11 THE CHAIRMAN: Again that's the same  
12 question that you asked before and I don't think it's a  
13 question that these witnesses should be asked to  
14 answer.

15 MRS. LAWSON: Okay.

16 THE CHAIRMAN: You see why, because it  
17 has got nothing to do with them. It is between the  
18 regulator and CAMECO. It is not anything to do with  
19 Ontario Hydro.

20 MRS. LAWSON: You see, I can understand  
21 that point of view, but I also heard when I was here  
22 before that they said of the regulator regulated.

23 THE CHAIRMAN: They were talking about  
24 the way they regulate Ontario Hydro. That's all that  
25 they can talk about.

1 MRS. LAWSON: Okay.

2 Q. You would agree, Mr. Johansen, that I  
3 have pointed out some of the hidden costs attributable  
4 to the nuclear industry?

5 MR. JOHANSEN: A. Well, I am not sure  
6 about the hidden part.

7 Q. Well, you didn't know about them.

8 A. Well, I don't think that means that  
9 they are necessarily hidden.

10 Q. Well, the Panel didn't know about  
11 them.

12 A. That may also be true.

13 Q. And that's why I came today.

14 A. And we appreciate that.

15 Q. Thanks.

16 Now, are these costs reflected in  
17 CAMECO's balance sheet?

18 THE CHAIRMAN: There is no way that they  
19 can answer that question. You would have to get that  
20 from CAMECO.

21 MRS. LAWSON: Q. Are they reflected in  
22 Ontario Hydro's balance sheet?

23 MR. PENN: A. Well, as I stated earlier,  
24 Mrs. Lawson, when we purchase process powder from  
25 CAMECO, we believe that that company is managing its

1 business and that we are paying for a product that  
2 includes all items of managing its business.

3 It's as straightforward as that.

4 Q. Mr. Penn, I have shown you that it  
5 hadn't managed its wastes and that the government of  
6 Canada has had to pick up the tab and the  
7 responsibility, and that's why I thought it was  
8 important.

9 A. Well, I realize that, Mrs. Lawson,  
10 and I don't live too far away from Port Hope.

11 Q. Really?

12 A. I live quite close actually.

13 Q. Where?

14 A. And in my knowledge, Eldorado has  
15 been a Crown corporation for very many years. And in  
16 fact, the waste you are talking, which is most  
17 unfortunate, was before the last World War. And in my  
18 understanding, the start of it --

19 Q. Mr. Penn, if you live near to Port  
20 Hope, you should know that the Port Granby dump site  
21 was not opened until the 50s. .

22 A. I wasn't commenting on that.

23 Q. Well, do you agree that inspite of  
24 all this research and all in expense, the radioactive  
25 contaminants still remain in our town?



1                   A. Well, I would agree that there has  
2           been a continual discourse and attention paid to this  
3           issue in my knowledge and it's a personal knowledge  
4           because as we have said before, Hydro doesn't have a  
5           direct responsibility in this issue, but in my personal  
6           knowledge there has been discussions between the Atomic  
7           Energy Control Board and Eldorado and now CAMECO for  
8           many years with regard to managing waste, and it is my  
9           personal understanding that there has been significant  
10          improvements.

11          [10:50 a.m.]

12                   Now, they may not be sufficient, but  
13          that's my understanding that progress is being made. I  
14          am not here to defend them--

15                   Q. No.

16                   A. --I am just trying to clarify my  
17          understanding of what is happening.

18                   Q. Well, you remember, don't you, that I  
19          told that an estimateed 235,000 cubic metres is still  
20          hanging around, and that myself, along with nine other  
21          citizens of the town are giving our time and trouble to  
22          try to work out a reasonably engineered safe disposal  
23          for this material.

24                   A. I think that's very important.

25                   Q. What assurance do we have that future

1 generations will not be saddled with our nuclear debt?

2 A. Well, as far as Ontario Hydro is  
3 concerned, we have provisions, for example, for the  
4 disposal of our waste. And the accounting policy  
5 followed by Ontario Hydro, according to the GAPP  
6 treatment, is that people who benefit from energy at  
7 this point in time have to share the cost of all  
8 aspects of the matter. So if part of your electricity  
9 bill and my electricity bill, something like .07 mills  
10 per kilowatt hour that you use goes towards providing  
11 for the eventual disposal of our used fuel. We are  
12 paying for it as we have been going along, and we have  
13 been doing so since 1984.

14 Q. You do understand, Mr. Penn, that  
15 myself, out of my own experience of 20 years of living  
16 with this town, in this town, I mean, I have lived in  
17 it all my life but I have been involved in the  
18 radioactive waste for 20 years, that along with eight  
19 other government agencies, we have all been trying to  
20 deal with the Port Hope problem and we still have it.  
21 That's 20 years. It took up until around '75 to know  
22 it was there and for 20 years, millions of dollars, all  
23 kinds of time, and energy on my part and you can  
24 imagine all these other ones, like the International  
25 Joint Commission and Environment Canada and so on, have

1 all been trying to deal with what is, in comparison to  
2 your waste, minimally hazardous. And we have got  
3 nowhere. We got minimally nowhere.

4 Now, my last question. How much longer  
5 since you have just told me that it is the energy using  
6 public that you have factored in the cost of the waste,  
7 like, the ongoing cost costs, like disposal of the fuel  
8 rod and the Precambrian shield costs, those are  
9 factored in to the costs of energy that I will pay for.  
10 That's what I am understanding you to say.

11 A. That is correct, and the eventual  
12 decommissioning of our nuclear plant is also being  
13 provided.

14 Q. You see, I'm really glad to hear that  
15 because all this other stuff I have been telling you  
16 was not factored in and is a hidden cost, all this past  
17 stuff. Like, the office of low level radioactive waste  
18 management, as you know, is paid for by the Department  
19 of Energy, etc., etc.

20 The eight government agencies are all  
21 funded through our taxes and are not paid for  
22 specifically out of the costs involved. So my  
23 question, to you, Mr. Penn, how much longer do you  
24 think the energy-using public will support such a  
25 problematic expensive form of energy?

1                   A. Well, if you are referring to nuclear  
2 energy for the--

3                   Q. Yes, that's what we are talking  
4 about.

5                   A. --purposes of generating electricity,  
6 I don't consider them problematic, and I don't consider  
7 that it's economic. My direct evidence has clearly  
8 shown that the economy that has occurred ever since we  
9 started the nuclear program in generating electricity  
10 and it's clear and on the record that this is the case.

11                  Q. You do not consider the examples that  
12 we have talked about this morning that I have laid  
13 before you -- you are saying that those were foreseen  
14 by the nuclear industry, those problems like the  
15 contaminated harbour, the schools that had 60  
16 picacuries of radon gas in their lunch rooms, I could  
17 go on endlessly but the Chairman doesn't want me to.

18                  A. I'm not disagreeing at all that those  
19 issues are here. But I did say in evidence that  
20 Ontario Hydro purchases about 10 per cent of the  
21 uranium mined at Elliot Lake, all of which is processed  
22 and refined by CAMECO.

23                  And you mentioned yourself, UF(6) plants  
24 are totally for the export of uranium.

25                  Q. We came to an understanding at the

1 beginning of this discussion that all the fuel for the  
2 CANDU reactors is bought in Port Hope, through Port  
3 Hope.

4 A. Yes. I'm just making a comment and  
5 I'm not make an excuse that Ontario Hydro purchases  
6 about 10 per cent of that total material. And when it  
7 purchases of CAMECO, it assumes that it is paying fair  
8 market price and that all matters related to dealing  
9 with all processes are being properly taken care of by  
10 the company involved. When we buy a generator from  
11 Westinghouse or--

12 Q. No, no --

13 A. --or B&W, we purchase a piece of  
14 equipment. It's the same way.

15 Q. Well, it's not at all the same as we  
16 have pointed out. These particular wastes last for  
17 hundreds of thousand of years.

18 MRS. LAWSON: Mr. Chairman, I want to  
19 respond to what Mr. Penn has just said by quoting to  
20 you from CAMECO's annual report of 1991.

21 In 1991, CAMECO concluded a long-term  
22 contract for the supply of UO(2)  
23 conversion services to Ontario Hydro, a  
24 major customer, which accounts for most  
25 of CAMECO's UO(2) conversion sales



1 volumes. CAMECO, the only Canada  
2 converter, supplies the Ontario utility  
3 with conversion service services for the  
4 fuel used in its current program of 18  
5 reactors.

6 MR. PENN: Well, I can't really help much  
7 more in this discussion. But I would point out that  
8 you are referring to natural uranium oxide. Ontario  
9 Hydro and New Brunswick Power Commission and Hydro  
10 Quebec are the only customers in the world that uses  
11 natural uranium oxide. The other uranium that goes  
12 through CAMECO goes through the UF(6) process, which is  
13 a necessary step to the enrichment of uranium.

14 MRS. LAWSON: Q. I'm sure you realize I  
15 understand all of this, and the problems I have been  
16 pointing out - because I'm through now - the problems  
17 in Port Hope came not from the UF(6) conversion  
18 process, because I know where those wastes are going.  
19 Where do you think the wastes from that new facility  
20 that I told you is one of the largest in the world,  
21 where are those wastes being stored now, Mr. Penn?

22 MR. PENN: A. I'm sorry, I don't know.

23 Q. I know Ms. Harvie says it doesn't  
24 matter because it hasn't anything to do with Ontario  
25 Hydro, but you brought it up. Those wastes are being



1 stored in drums, in sheds in Port Hope because there's  
2 no waste facility for them. The problems I was  
3 referring to are directly associated with the fuel  
4 supplied to Ontario Hydro's nuclear reactors. The Port  
5 Gramby dump, the Welcome dump, the waste disposed  
6 around Port Hope, the waste dumped in the harbour would  
7 not have been there if the nuclear generating plants  
8 had not existed in Ontario.

9 A. Well, all I can say is Hydro doesn't  
10 do business with companies that don't obey the law and  
11 aren't regulated.

12 Q. Well, I don't need to emphasize the  
13 fact --

14 THE CHAIRMAN: I think we have a pretty  
15 fair idea of what both side's position is, and I don't  
16 think it's going to help very much to prolong this  
17 debate rather than cross-examination.

18 MRS. LAWSON: Thank you, Mr. Chairman.

19 THE CHAIRMAN: Thank you, Mrs. Lawson.  
20 Does that complete the examination for your side, or  
21 does Mrs. deQuehen have further questions to ask?

22 MRS. deQUEHEN: Yes.

23 MRS. LAWSON: Yes.

24 THE CHAIRMAN: She has further questions  
25 to ask?

1 MRS. LAWSON: Yes.

2 THE CHAIRMAN: We will take a break, a  
3 morning break, 15 minutes.

4 THE REGISTRAR: Please come to order.  
5 This hearing will take a 15 minute recess.

6 ---Recess at 11:00 a.m.

7 ---On resuming at 11:17 a.m.

8 THE REGISTRAR: Please come to order.  
9 This hearing is again in session. Be seated, please.

10 CROSS-EXAMINATION BY MRS. deQUEHEN (Cont'd):

11 Q. Dr. Whillans, yesterday, if I we may  
12 just back over some ground for a moment, when we were  
13 discussing the results of Three Mile Island and the  
14 discrepancy between the large number of deaths that had  
15 occurred, 617, which I had estimated, and the small  
16 number which the risk assessment predicted, which was  
17 something like .03 some 20,000 difference, Dr. Connell  
18 made a remark, or asked a question, whether it was true  
19 that the dose assessment had been under estimated, and  
20 in fact it should be a larger dose, then surely this  
21 would mean that the risk must be smaller, if the dose  
22 is larger then the risk is smaller.

23 Do you remember that?

24 DR. WHILLANS: A. I remember that  
25 conversation. I don't know whether we had --

1 Q. And your response to that I imagined  
2 you had disagreed with Dr. Connell, or did you agree?

3 A. I think I agreed.

4 Q. Well, I had thought that you had  
5 disagreed with Dr. Connell, so I let it pass, but what  
6 I just had a glance at the transcript I realized that  
7 you had agreed with him. So, I wonder whether we  
8 could, to clarify the position, we could just look at  
9 this piece of paper?

10 A. Yes.

11 THE CHAIRMAN: Maybe we could give the  
12 piece of paper a number.

13 MRS. deQUEHEN: Well it is just --

14 THE CHAIRMAN: Well, still it is  
15 something that people reading the transcript want to  
16 look at. So, could we give it a number, please?

17 THE REGISTRAR: 674, Mr. Chairman.

18 THE CHAIRMAN: Thank you.

19 ---EXHIBIT NO. 674: Applying a relationship.  
20 Handwritten equations by Mrs. deQuehen.

21 MRS. deQUEHEN: Q. Because I think that  
22 it is a problem which I have seen crop up quite a bit  
23 and I think it is an important point.

24 Applying the relationship is something  
25 quite different to verifying a relationship. Do you

1 think we could --

2 THE CHAIRMAN: I am a little bit lost  
3 here. Before we get into this, it seemed to me just a  
4 fundamental matter, not even of logic that if the dose  
5 was underestimated and the risk was based on the  
6 estimate of the -- the wrong estimate of the dose, that  
7 if it was underestimated that consequently from that  
8 would be the risk is lower; does that make sense?

9 DR. WHILLANS: I am wondering whether  
10 there is any confusion about whether we were predicting  
11 a number of deaths from a relationship or deriving a  
12 risk estimate. I thought we were talking about a risk  
13 estimate. And it was simply the case that if you have  
14 a certain number of effects caused by a dose, then the  
15 risk per unit dose is divided by the dose. And if you  
16 had underestimated the dose then you would, if I  
17 haven't confused myself, overestimate the risk.

18 Now, Mr. King is talking a risk  
19 calculation and in that case things get reversed. You  
20 multiply the risk per unit dose times the dose to get  
21 the number of the effects, and in this case if you had  
22 underestimated the dose you would predict fewer  
23 effects. So, we have may have some confusion about  
24 exactly what was being done here.

25 MRS. deQUEHEN: Q. Well, it is two

1 completely different things. The first is, if you are  
2 looking --

3 THE CHAIRMAN: The risk part of the dose  
4 equals the effects, is that it?

5 DR. WHILLANS: That's right.

6 THE CHAIRMAN: So, if the risk times the  
7 dose equals the effects and the effects are constant,  
8 then doesn't it follow that if the dose is higher, the  
9 risks have to be lower?

10 DR. WHILLANS: Yes.

11 I think maybe I should let you do your  
12 own but you seem to have said that here.

13 MRS. deQUEHEN: Q. Yes, on the first  
14 page it's exactly what I have said. If I could just go  
15 through A and B.

16 If D were underestimated, it should be  
17 larger for deaths D. If dose is larger, risks will be  
18 lower.

19 B, if D were overestimated, it should be  
20 smaller and dose was smaller, risks will be a higher.  
21 But here you are applying a relationship.

22 What we were doing yesterday was  
23 verifying a relationship which is quite different. We  
24 start with the same supposed risk coefficient, we start  
25 with that same little box, the risk coefficient being

1 the turn or the angle, or is the risk on the horizontal  
2 axis is D, the dose, vertical axis, death.

3 For dose D, the same as we did overleaf,  
4 for dose D you will get certain amount of deaths. Then  
5 we tested it for dose D, which was known but we didn't  
6 get D. What we got was an enormously high dose, 20  
7 times D.

8 So, it is quite a different situation to  
9 the first page where, for a set numbers of deaths, you  
10 are changing the doses.

11 What we have got here is an enormous  
12 increase in the number of deaths.

13 So, now you have two extremes, you have  
14 risk, not risk D -- deaths upon dose, but risks 20,000  
15 times deaths upon dose.

16 Either you are saying, well, you have an  
17 exceedingly high risk which is 20 times higher, or you  
18 can reduce that risk by saying perhaps your dose has  
19 been underestimated, in which case you say perhaps your  
20 dose has been underestimated by 20,000 times in which  
21 case you will be left with the same risk. But there is  
22 no way that you can get a lower risk unless you say  
23 your dose is even higher than 20,000 times?

24 DR. WHILLANS: A. I haven't looked at  
25 ever word on these pages but I don't think we disagree,



1 and maybe there was a misunderstanding. I agree with  
2 you.

3 Q. In the context --

4 THE CHAIRMAN: Let him answer.

5 MRS. deQUEHEN: Sorry.

6 DR. WHILLANS: I agree with you that if  
7 you can demonstrate that there were 670, I think was  
8 your number, a large number of excess deaths, then that  
9 would suggest that the risk coefficient should be  
10 higher than we are assuming unless of course the doses  
11 were misestimated but I don't think my disagreement  
12 with you had to do with how you would derive the  
13 number. I think I disagreed about the number 670.

14 MRS. deQUEHEN: Q. Well, you said what  
15 was the reliability with regard to that number.

16 DR. WHILLANS: A. That's right. I think  
17 given what the authors had said about their own data,  
18 and just looking at the range of the uncertainties in  
19 the individual numbers that you had summed up, I  
20 suspected that those numbers might not be significant,  
21 statistically different.

22 [11:30 p.m.]

23 Q. Well, I can only estimate the  
24 uncertainty, because to do statistics I would need the  
25 rough data, but the uncertainty I estimated was between

1 550 and 720, of that range, but it certainly was  
2 significant.

3 That was another point. It was just  
4 merely that within the context of what we were speaking  
5 of yesterday --

6 A. I think actually Dr. Connell's  
7 question came up when we are talking about the Schleien  
8 paper and they had talked about 40 studies, and I think  
9 they had made the comment that often the doses were  
10 underestimated.

11 Q. Yes, but I think it was in relation  
12 to what we had been talking about with this type of  
13 study where an effect is found of deaths which do  
14 not -- where there is discrepancy between the deaths  
15 found and the risk estimate. So either the risk  
16 estimate must be wrong, it must be higher, or the dose  
17 estimate must be higher, or it can be both?

18 A. Well, in your case if it had been  
19 demonstrated that there were 670 deaths and it happened  
20 that the dose estimate was not, I think it was .1  
21 millisieverts, it was 10 times or 100 times lower, then  
22 the risk estimate could still be the same to account  
23 for your number; right, or have I got that wrong?

24 Q. Well, if the dose were -- I mean, if  
25 you just look --

1                   A. I think perhaps I have got that  
2 wrong.

3                   If they are mis-estimated in the other  
4 direction so the doses were much higher, then they  
5 could account for your numbers. Yes, I do have that  
6 backwards.

7                   So either of those situations could  
8 account for the number, once you had demonstrated that  
9 there was a number such as 670. But I think my --

10                  Q. I cannot demonstrate further than  
11 what I had see from the crude data. I mean, I cannot  
12 definitely state that. I am merely saying it was  
13 indicative of a large number of deaths.

14                  All I wanted to emphasize here was that  
15 these two situations are completely different. In this  
16 you have constant number of deaths and you have the two  
17 directly related so they are inversely proportional.  
18 Here you are verifying a relationship where your deaths  
19 change and you are trying to see whether in fact you  
20 can verify that relationship.

21                  A. I think those were the two situations  
22 the Chairman was speaking about.

23                  Q. If we could turn to reference 6.

24                  THE CHAIRMAN: That's Exhibit 370?

25                  MRS. deQUEHEN: Yes, in the green folder.

1 Q. I would just like to quickly refer to  
2 two Hanford studies, very quickly.

3 Mortality of workers at Hanford site from  
4 1945 to 1981. This is actually an update of work done  
5 by the same group whose original studies contradicted  
6 Mancozo and Stewart who had found a 30 per cent  
7 increase in mortality of the workers. And then this  
8 group did a study which contradicted it and this is an  
9 update of that study.

10 In this study we have the usual  
11 statement, no evidence of causal effects, however if  
12 you read the paper there are indeed effects in the same  
13 way, there are effects but it cannot be established  
14 that there is a causal relationship.

15 DR. WHILLANS: A. Excuse me, I think in  
16 the abstract the authors do refer to some statistically  
17 significant effects, and the question I think becomes  
18 one of what that means.

19 Q. Yes. I think the point I have been  
20 trying to make is, it is difficult, it is confusing or  
21 do not think that confusion arises for people trying to  
22 interpret these papers. What happens is a  
23 simplistic -- and again, I am asking you whether you  
24 think this does not happen, a sort of simplistic  
25 statement that a following paper then denied. The

1 first researchers produced these positive results, a  
2 following paper then denied it. That is the way --

3 A. You are talking about this paper as  
4 opposed to the previous version?

5 Q. I am talking in general, all these  
6 studies that are done. And I think that that is what  
7 has been happening at this hearing, is that these  
8 researchers discovered this and then within BEIR's it  
9 was denied.

10 Do you think that is not a problem that  
11 arises when we try at this type of level to interpret  
12 studies?

13 A. Well, I think it is inevitable when  
14 there is new information and especially in areas like  
15 epidemiology where there is essential uncertainty in  
16 any given interpretation. Especially when we are  
17 talking about epidemiological studies with humans there  
18 are many factors that aren't controlled and any one of  
19 them I suppose could account for results. So there is  
20 always a certain amount of professional judgment, I  
21 think, in the interpretation and I don't think it's  
22 surprising that as new information becomes available,  
23 that judgment could change.

24 Q. Absolutely, but what happens is that  
25 the data is modified. It is added, a lot of



1 information accrues, et cetera. But it is not as  
2 simple as positive effects and denial. Denial is the  
3 thing which I think that industries like yours  
4 dependent upon a lot. Would you admit to that?

5 A. I don't think I could admit to that.

6 Q. And very rarely do you see in any  
7 field of study the word denial. You merely say this  
8 cannot be substantiated, or was by this group. It's a  
9 complex situation but you oversimplify it by saying  
10 denial and you did the same thing when we were talking  
11 about in utero X-rays studies, you said it has since  
12 been denied. As simply as that. I mean, even if a  
13 paper is put out which denies it --

14 A. I am not sure I used that word.

15 MS. HARVIE: If you are going to put  
16 suggestions like that you must allow the witness an  
17 opportunity to respond.

18 DR. WHILLANS: If I used the word  
19 "denied" I probably shouldn't have. I don't think I  
20 did.

21 What I suggested was that you gave us an  
22 example where at one time some people interpreted the  
23 data to suggest that there was an effect with  
24 trimester. And others said, well, the evidence isn't  
25 strong enough to support that, and 20 years later the



1 evidence now seems to suggest that that is not the  
2 case. I was pointing out that this is one of the  
3 reasons epidemiologists are often cautious about  
4 over-interpreting data. Sometimes data may suggest  
5 something, there may be something that is of borderline  
6 significance and they are not willing to say, well,  
7 this means such-and-such, and the reason is that they  
8 are aware that there are many other possible  
9 interpretations. And I think a professional  
10 epidemiologist keeps those things in his own knowledge,  
11 he uses them when he decides how to test data, but he  
12 doesn't -- he is not willing to conclude that that is  
13 the absolute interpretation of the data that he is  
14 working with.

15 MRS. deQUEHEN: Q. Thank you, Dr.  
16 Whillans.

17 But my question is this: My real problem  
18 is when it comes to putting over information to the  
19 public. Now, the very first paper that we dealt with  
20 on breast screening you said you agreed with the  
21 position and on several other occasions you agreed with  
22 the position of simplifying it for the public so that  
23 there would be no confusion. And one of the ways, I am  
24 asking you, is not of the ways in which you simply it  
25 for the public but just merely stating denial?

1 THE CHAIRMAN: Well, I think you have to  
2 give him an example of where that has happened. I  
3 don't know whether you have done that. It certainly  
4 could be a way, but there is no suggestion that that's  
5 what is done.

6 DR. WHILLANS: It would be helpful if you  
7 could give me an example.

8 MRS. deQUEHEN: Q. Well, perhaps as we  
9 go along I will come across one where there is denial,  
10 but I certainly have come across it -- I don't have one  
11 just --

12 DR. WHILLANS: A. But I do agree that I  
13 agreed yesterday that for various reasons it's often  
14 useful to present the same information in different  
15 ways, and I guess the public has to rely on regulators  
16 or peer review process or intervenors or other people  
17 who do not have our point of view to challenge it, and  
18 I guess that is what you are doing now.

19 But I don't think it is necessarily for  
20 the purpose of hiding the facts. The facts are often,  
21 as this is, published in sources that are available to  
22 anyone. And if you want more information, it's usually  
23 possible to find it.

24 But for the purpose of making a simple  
25 statement about whether we believe something is safe or

1 not, we might often give the main result and refer to a  
2 paper. We wouldn't complicate the transmission of that  
3 information with numbers that are often hard for the  
4 public to understand. But I don't think it's usually  
5 for the purpose of misleading.

6 Q. Yesterday you used phrase for the  
7 public good, you felt that breast screening, they were  
8 entitled to present it in that fashion to the public  
9 because it was for public good.

10 Now, I mean, surely the nuclear industry  
11 who believes it is for the public good to have nuclear  
12 power, will then feel themselves entitled to present  
13 evidence in such a way, even if it is not strictly  
14 true, they imagine it is then going to be for the  
15 public good, wouldn't they, they would be able to do  
16 that?

17 THE CHAIRMAN: I don't know what the  
18 significance of the question is. Are you suggesting  
19 that's what they do? Dr. Whillans' answer is, as I  
20 understand it, that when you have to communicate at  
21 different levels of understanding, you have to do it in  
22 different ways and what you are trying to do is to  
23 communicate fairly what the situation is without  
24 misleading. But that you can't always use the same  
25 kind of language as you use in a scientific paper when

1 you are trying to inform the public about a particular  
2 issue.

3 I think that has been a problem that has  
4 been going on for a good long time. I recognize it's a  
5 problem but I don't know how Dr. Whillans can help you  
6 anymore on that than he already has

7 MRS. deQUEHEN: Perhaps I could ask one  
8 more question.

9 Q. Dr. Whillans, don't you think in the  
10 long run, the best way to present information is to try  
11 and present the truth? Not to reassure, not to present  
12 the most optimistic thing, but to just try and present  
13 the truth. And if you are presenting a number .05 and  
14 in fact the range of uncertainty is .15 to .005, then  
15 present it as such. And I don't believe that that will  
16 confuse the public if you just say that is the range of  
17 uncertainty.

18 DR. WHILLANS: A. I think in many  
19 circumstances a range is given, perhaps even without  
20 that central number.

21 I guess I wouldn't want to generalize  
22 because I think you are more familiar with numbers than  
23 many people are. And I think you have to recognize  
24 that if the object is to present a fair estimate of the  
25 result, whatever that .05 was, it doesn't help to

1 present it in such a way that nobody can understand it.

2 Now, I am not saying that most people  
3 can't understand the range. I think in that example it  
4 would be fair to give the range. But we were talking  
5 about much more complicated statistical terms before.

6 Q. In this paper, although they say  
7 there is no causative linkage, what is interesting is  
8 the level of risk which they found. Where ICRP  
9 estimated four cancer risks, which is the figure that  
10 we used yesterday, per million person years, that is in  
11 the paper, it's here, per 10 millisieverts, and BEIR 3  
12 estimated 2.5 cancer deaths, or if you want to follow  
13 it, it is on page 22 -- I beg your pardon, it's on the  
14 last page, the first column, for best estimate.

15 BEIR would estimate 2.5 cancer deaths per  
16 million person years, per 10 millisieverts, this study  
17 in fact finds 13 cancer deaths.

18 A. I think actually that's minus 13.  
19 One of the results of the Hanford study has been that  
20 there seems to be an unexpected relationship with dose.

21 Reading from the abstract:

22 Estimates of cancer risk due to  
23 radiation negative but confidence  
24 intervals were wide.

25 Q. Well, I must admit I misread that. I



1 thought it was -- I didn't know you could have minus 13  
2 deaths. I thought it was just part of the punctuation.

3 A. I haven't looked at this in detail,  
4 but my understanding of the study is that if they look  
5 at different dose groups they find --

6 Q. Because of the healthy worker effect?

7 A. Well, the healthy worker effect is  
8 assumed to apply to all workers. So this is something  
9 beyond that.

10 This is essentially saying that there are  
11 fewer deaths in the groups that have higher doses.

12 But really all I see here is the minus 13  
13 and the limits going from minus 59 to 44, and I guess I  
14 would have to look through the paper carefully to be  
15 confident of what I am saying. But that's my  
16 understanding of the Hanford data, generally.

17 Q. Well, I am sorry, it never occurred  
18 to me that this could be minus 13 deaths.

19 A. Let's say that I am correct about  
20 this, I don't think the ICRP would say that this proves  
21 that doses of radiation of this size are good for you.  
22 This is one study with its range of uncertainty and on  
23 that number, for example, the minus 13 goes from minus  
24 53 to plus 34. So it certainly doesn't prove that for  
25 this population radiation was good for them. It is



1 just one other study which has to be taken together  
2 with other data.

3 Q. Well, then my point is misplaced. I  
4 withdraw it, I'm sorry.

5 If we could just go to the next Ontario  
6 Hydro study, Ontario Hydro Mortality, reference 7, page  
7 18 and 19.

8 The figures refer to the standardized  
9 ratio. If there were no radiation effects, no  
10 causative effects and the correct control or perfect  
11 control had been used, that ratio would be 100; is that  
12 right?

13 A. Generally, yes.

14 Q. But due to the healthy worker effect,  
15 workers being healthier than the general population,  
16 the ratio is down at a much lower level?

17 A. Yes.

18 Q. If we move to circulation we can see.

19 A. Yes, I think for circulation you can  
20 see that the numbers jump all over the place from 16 to  
21 77 and that's because if you look at the top row, we  
22 are talking about over this whole period only one case  
23 or four cases or two cases in any particular group, and  
24 so the statistical uncertainty is quite great.

25 Q. Yes. It is great as you can see from

1 the range of values. But if you were to draw any  
2 conclusion from this at all, to compare these workers  
3 to the general population really doesn't tell you  
4 anything.

5 [11:55 a.m.]

6 What you really want is internal control  
7 in the study to tell you anything at all.

8 A. I agree that that's a much better  
9 comparison where you can do it.

10 Q. Yes. The question you really wanted  
11 to ask is, do these healthy workers -- are these  
12 healthy -- have they shown any effect at all, any  
13 cancer effects?

14 Now, circulation should not be related to  
15 the same degree as cancers to radiation. So, you can  
16 use circulation as an internal control to a certain  
17 extent.

18 A. It would be problematic to do that.

19 Q. Problematic to do that, but it can  
20 tell you something. Because the radiation should not  
21 affect circulation to the same extent. What you want  
22 to see it does it effect -- cause more cancers, then it  
23 has effect upon circulation. If you use it as an  
24 internal control, it shows no effect, no radiation  
25 effects are shown at .01 to 10. And if you look at a

1 lot of these mortality studies, you see the same  
2 pattern emerge.

3 I have left out the very highest dose.  
4 It is well-known in experimental work and in a lot of  
5 studies that at exceedingly high doses the cancer rate  
6 falls off due to premature death in the case of  
7 epidemiological studies, due to self injury in the case  
8 of cellular studies.

9 What you often get is a cross-over. You  
10 would get premature deaths through circulation because  
11 those would occur before cancer is actually evident.  
12 So, leaving out the higher dose where problems can  
13 occur and often you do get that fall off at high doses.  
14 It is a well known phenomenon.

15 A. That is selection of data.

16 Q. Certainly. But I am just saying with  
17 this particular selection of data, you will find and  
18 you will find it in almost all of these studies using  
19 an internal control of some other syndrome in this  
20 fashion, you will get this number averaging, not  
21 fractionating, but just seeing whether there is a an  
22 increase in cancer over some syndrome that is not  
23 effected by radiation?

24 A. And you get 86 to 49 which is  
25 something like 1.75. The range comes to something

1       like 1.20 to 2.30. So it is a large range. But it  
2       does show that there is the possibility of a 20 per  
3       cent upwards increase in these healthy workers.

4               THE CHAIRMAN: That's question, I take  
5       it, is it?

6               MRS. deQUEHEN: Yes.

7               DR. WHILLANS: I have a little bit of  
8       trouble with your method here. One of the problems is  
9       that that 86 is an average, I guess, of 76, 90, 59 and  
10      120?

11              MRS. deQUEHEN: Q. That is right.

12              DR. WHILLANS: A. So this would be what  
13      I guess you would call an unweighted average.

14              Q. Yes.

15              A. And I think because there are  
16      different numbers of workers in each of these groups,  
17      that might not be representative of the neoplasm SMR as  
18      a whole.

19              Q. But it is a standardized ratio?

20              A. Well, I would have thought the other  
21      way to do this would be just to look at the numbers,  
22      the standardized mortality ratio in the zero group, the  
23      next group and so on up to the 150 to 199 group and to  
24      see whether the number is increasing with dose. That  
25      is the usual benefit of dividing it.

1 Q. Oh, certainly.

2 A. And I think this exhibit, or at least  
3 the reference, was concluded with our exhibits and I  
4 guess we could get out the full paper. But I believe  
5 Dr. Anderson did test whether there was a significant  
6 increase with dose and didn't find one. Now, we could  
7 check that.

8 But I would have thought that was a more  
9 direct way to do it and it was free of any concerns  
10 about whether circulation varied within these groups  
11 and why, and whether it was related to radiation dose.

12 Q. Dr. Whillans, isn't it true that for  
13 such a dose response relationship which you are  
14 suggesting, you really need a well controlled  
15 experiment. There is great difficulty in finding a  
16 dose relation response in numbers like these which jump  
17 all over the place, as you say.

18 A. Well, I think --

19 Q. In the absence of that, I realize  
20 that that would be ideal, but in the absence of that,  
21 all I am saying is there is indication, if you look at  
22 it this way, there is indication that there could be  
23 from 20 per cent upwards of an effect.

24 A. Well, I don't think I can agree with  
25 your number. It has been selected -- if you had

1 included the .01 to 9 group, for example, in your  
2 averages, it would have brought them much closer  
3 together because neoplasms was much less than  
4 circulation.

5 So, you are applying some preconceptions  
6 when you select four out of seven and average them in  
7 an unweighted way and just talk about the ratio. I  
8 think it is something that you can do, but when you  
9 interpret it as indicating possibly 75 per cent greater  
10 risk of neoplasms, I think that interpretation is  
11 probably not correct.

12 Q. I think, what I am saying is --

13 THE CHAIRMAN: No, no. It's not what you  
14 are saying, it is what Dr. Whillans is saying that we  
15 are interested in. So, if you want to ask a follow-up  
16 question on that, but he has given his view of your  
17 analysis.

18 MRS. deQUEHEN: Q. Dr. Whillans, did I  
19 not make it clear that I am only saying that I am  
20 looking at risk above 10 millisieverts?

21 DR. WHILLANS: A. And below 200.

22 Q. I explained why I left out the  
23 higher--

24 A. Yes.

25 Q. --the very highest number, which



1 is --

2 THE CHAIRMAN: Well, I think you did  
3 explain it and you may be right. I am not saying you  
4 aren't, but Dr. Whillans doesn't agree with you about  
5 that.

6 DR. WHILLANS: I think I understand what  
7 you have done and apart from the concern I had about  
8 the way in which you combined those numbers to get an  
9 average, it is something that you can do with these  
10 numbers. I think where we disagreed is on what it  
11 means. And I guess that's where it stands.

12 MRS. deQUEHEN: Q. If we could just look  
13 at reference 8. A feasibility study by an independent  
14 group who were funded to look at the effect of  
15 emissions on down winders after repeated reports of  
16 excess total cancers and thyroid cancers, and repeated  
17 denials - and these were denials and this is -- I  
18 haven't got the actual papers with me here, but this is  
19 an example of denials by the industry again and again.

20 Dr. Whillans, are you aware of this  
21 situation?

22 DR. WHILLANS: A. Generally, yes. I  
23 would point out that it is mainly not a nuclear power  
24 generation facility. This is a facility that produced  
25 nuclear weapons during and after the last world war.

1 And there were, I guess, some essential confidentiality  
2 problems.

3 But I wouldn't disagree with you that  
4 there has been a lack of information to the public over  
5 the years about what actually did happen at that time.  
6 And it is in the open now and being fairly thoroughly  
7 investigated, I think. But it is not a power  
8 generation facility.

9 Q. I didn't state that it was, did I?

10 A. No, no. I mentioned that only  
11 because I think there are different problems about  
12 communication of information about those facilities and  
13 power generation.

14 Q. Preliminary reports of this  
15 particular study stated that often repeated denials  
16 that in fact the emissions had been high. If you just  
17 turn to the last paragraph:

18 "Results from dosimetry reconstruction  
19 whether

20 preliminary or detailed, can clarify many  
21 questions about health risks and  
22 environmental

23 contamination in communities adjacent to  
24 nuclear

25 facilities.

1 "Dose estimates from a reliable  
2 dosimetry reconstruction are also  
3 necessary for determining whether a  
4 nuclear facility was the likely cause of  
5 a statistically significant increase in  
6 disease in a nearby community. For this  
7 reason, we recommend that dosimetry  
8 reconstruction always be undertaken when  
9 scientists are asked to resolve issues of  
10 health risks from nuclear facilities.  
11 We also suggest there is little value in  
12 conducting epidemiologic studies in the  
13 absence of these dosimetry estimates."  
14 I really just introduced this paper  
15 because --

16 THE CHAIRMAN: Do you want any comments  
17 from Dr. Whillans from that conclusion?

18 MRS. deQUEHEN: Yes, I would like you to  
19 perhaps acknowledge the fact that people realize --

20 THE CHAIRMAN: Why don't you ask him  
21 whether he has any comment on that thing that you have  
22 just read into the record?

23 DR. WHILLANS: Are you asking me that?

24 THE CHAIRMAN: Yes,

25 DR. WHILLANS: You are asking me that.

1 Yes, I don't disagree with that. I guess  
2 I was going to point out that it is very similar to  
3 something we talked about yesterday and one of the  
4 authors of this paper is also one of the authors her  
5 reference 4, and he comes from the Centre for Disease  
6 Control in the U.S. And they have it as their business  
7 to look into these kinds of situations, to recommend  
8 adequate methodologies and to point out work that needs  
9 to be done and I would agree with that he says.

10 THE CHAIRMAN: Now, you had another  
11 question that you wanted to ask following that.

12 MRS. deQUEHEN: Q. Would you agree that  
13 up to this stage it has been neglected to be done up to  
14 these last few years?

15 DR. WHILLANS: A. With regard to the  
16 Hanford situation?

17 Q. With regard to epidemiological  
18 studies?

19 A. Well, I don't think generally I would  
20 agree with that. Some studies have made efforts to do  
21 this and others have not made the effort. In some  
22 cases it's very difficult.  
23 In this particular case it is very difficult because  
24 many of the exposures occurred 45 years ago.

25 Q. Well, yes. But the paper we

1 reviewed, looked at yesterday, would you agree that  
2 their main criticism of the epidemiological studies was  
3 that people had failed to do dose reconstruction?

4 A. That certainly was a criticism, yes.

5 Q. The problem has been recognized for a  
6 long time and it has recurred in many industries.  
7 Studies are being funded by an industry or radiation  
8 community which is reluctant to find effects.  
9 Therefore, it cultures denial of effects and linkages  
10 in obscure conclusions in terms. You have to look  
11 behind the terms to see what the conditions really are;  
12 do you agree with that?

13 A. No, I could not agree with that.

14 Many of these studies, in fact the one  
15 that you were are citing now, are not carried out by  
16 the industry. None of these authors is a member of the  
17 industry. I think that's often true.

18 Q. Didn't I refer to this paper as an  
19 example of people who were attempting to really look  
20 and see if there were effects that it had been denied  
21 and this was an independent study that people had asked  
22 for. I was not saying that this particular study was  
23 part of the industry. This was a result of people  
24 fighting for independent studies.

25 [12:10 p.m.]

1           A. I think you are asking me generally,  
2           and for example the studies that we referred to in our  
3           direct evidence of leukaemia around power facilities  
4           were not carried out by the industry, nor was the birth  
5           defects study carried out by the industry.

6           I think it is generally recognized that  
7           studies like this have much more credibility if they  
8           were not carried out by the industry. This may not  
9           have been as true in the past, but I think it's always  
10          been true to some extent.

11          Q. With regard to regulations and the  
12          process of regulation, and authorities behind the  
13          assessment, I think you are agreed, Dr. Whillans, that  
14          there are generally two different groups who are  
15          actually involved, there are the researchers or the  
16          scientists upon which ultimately all conclusions --  
17          upon the worker which the ultimate conclusions are  
18          based, there are the regulators or the assessors who  
19          are comprised governmental agencies such DOE, EPA, and  
20          AECB?

21          A. Yes.

22          THE CHAIRMAN: Are you thinking about two  
23          groups within the regulation framework?

24          MRS. deQUEHEN: Yes, I am talking about  
25          the researchers.



1 THE CHAIRMAN: I understand, but these  
2 are within the regulation framework, is that what you  
3 are saying?

4 MRS. deQUEHEN: Yes.

5 DR. WHILLANS: I think you are saying the  
6 former group are the people who develop the data and  
7 then there is a second group which apply the  
8 regulations.

9 I was going to point out that a group  
10 like ICRP lies somewhere in between. They attempt to  
11 provide recommendations based on research done by  
12 others, but they do not develop regulations for any  
13 particular country. They simply make some  
14 recommendations and some group such as the AECB will  
15 take those and adopt it as they think it is necessary  
16 for Canada, for example.

17 So you are right, there are some distinct  
18 groups and you could categorize them into those two, if  
19 you like, but I think there are others like the ICRP  
20 that may fall in between. They don't do the research  
21 themselves, they rely on, for example, UNSCEAR's  
22 analysis or they may have commissioned some of their  
23 own analysis, but neither do they actually create or  
24 create regulations. They just make recommendations.

25 MRS. deQUEHEN: Q. Can you tell me who

1 funds the ICRP?

2 DR. WHILLANS: A. Well, I don't know in  
3 detail.

4 My understanding is that the members are  
5 self-supported except for the secretary, for example,  
6 there may be some funds to cover that. But I  
7 understand that most of the members represent a country  
8 or the university or whatever organization they belong  
9 to and that they fund their own travel, for example.  
10 But I don't know that, I am not a member of the ICRP.

11 Q. If we could turn to reference 9,  
12 Scientific Briefing Session: What the NCRP should be  
13 Doing for Federal Agencies. And I know this is the  
14 States, not Canada, but the fact is NCRP are one of the  
15 main research groups in the field; are they not?

16 A. I have referred to their reports  
17 quite a few times in evidence, yes.

18 Q. Certainly. But they are more or less  
19 on the side of the researchers, they are one of the  
20 researchers?

21 A. Well, they are research groups in the  
22 sense of organizing reports. They don't themselves, to  
23 my knowledge, have experimental laboratories. They  
24 draw people from various areas of expertise,  
25 universities and some government labs, and put them

1 together in committees that will produce a report, for  
2 example, on carbon-14. So they are a research group in  
3 the sense that they are not funded by industry  
4 particularly, but they aren't actually developing the  
5 data such as we have seen in some of your references.  
6 They synthesize it into some sort of a report.

7 Q. They do give a report.

8 A. They are similar in a lot of ways to  
9 the ICRP except that they are an American association.

10 Q. Well, all the people in the NCRP are  
11 involved in research?

12 A. Well, I guess we would have to define  
13 research. I think they are involved in the way I just  
14 said. They are often senior people who may come from a  
15 research laboratory, they may come from a government  
16 agency. Their membership, I think, is based on their  
17 own personal expertise.

18 Q. If we could turn to page 277. If I  
19 may just read this and ask for your comments.

20 Because of the public trust placed in  
21 scientists, the counsel, as a body of  
22 scientists, has a special relationship in  
23 conveying to the --

24 THE CHAIRMAN: Responsibility.

25 MRS. deQUEHEN: I beg your pardon.

1                   ...has a special responsibility in  
2                   conveying to the public its views of  
3                   health risks from radiation and  
4                   especially on specific issues of  
5                   particular public interest, such as  
6                   emissions arising from research reactors  
7                   or from a class of consumer products that  
8                   may require the use of some source of  
9                   radiation. As scientists you can provide  
10                  the public a perspective of radiation  
11                  risk and protection perhaps more  
12                  acceptable than we who live in a fish  
13                  bowel in which we are viewed with some  
14                  skepticism from all directions. You have  
15                  an opportunity to build confidence in  
16                  your views and improve your public  
17                  understanding of radiation that enables  
18                  you to separate scientific facts from  
19                  emotional arousing fantasies... Et  
20                  cetera.

21  
22                  THE CHAIRMAN: I think you might go --  
23                  Well, all right, stop there.

24                  Go ahead, do you want to ask his comments  
25                  on that passage?

1 MRS. deQUEHEN: Yes.

2 THE CHAIRMAN: Wait a minute. Do you  
3 have any comments to make on that passage?

4 DR. WHILLANS: Well, this is the view of  
5 a member of the U.S. Nuclear Regulatory Commission.  
6 But I would agree almost entirely with what he says,  
7 that groups such as that and the AECB rely on  
8 scientists to present an objective view, because they  
9 are seen as being more independent.

10 THE CHAIRMAN: Now you have a question to  
11 ask him?

12 MRS. deQUEHEN: Q. So, it is the  
13 credibility of scientists which they are relying upon?

14 DR. WHILLANS: A. Yes,

15 Q. If you could turn to page 279 for  
16 another view.

17 However, the council must recognize  
18 that its role and relationship to an  
19 agency like EPA in risk management is  
20 likely to be different than its role in  
21 risk assessment.

22 A. Yes.

23 Q. They are drawing a distinction  
24 between risk management and risk assessment?

25 A. Yes. Those are different activities.

1 Q. Could you please outline the  
2 difference between risk management and risk assessment?

3 A. Maybe I should ask Mr. King for his  
4 definition.

5 MR. KING: A. I believe what it refers  
6 to, risk assessment is composed of a risk estimation  
7 process where you quantitatively estimate the risk, and  
8 I believe but I am not positive in their use of the  
9 word risk assessment, I believe they include risk  
10 evaluation as well.

11 We would include it here, risk evaluation  
12 where you look at the estimated risk, compare it to  
13 some standard that you have set, and that whole process  
14 would be part of risk assessment.

15 Risk management is then the actions, in  
16 their definition I understand is the actions then that  
17 you take following the risk assessment process, control  
18 actions, et cetera, continued monitoring and those sort  
19 of things.

20 Q. And what is likely to be different  
21 there, why is he telling you these two things?

22 MS. HARVIE: I can only suggest that the  
23 article speaks for itself. I don't know how these  
24 witnesses can speak to what the author intended unless  
25 there is some statement in the document that will



1       assist.

2                       DR. WHILLANS: I guess I would agree.

3       Without reading through the article to get the context,

4       I guess I shouldn't guess at what is meant.

5                       MRS. deQUEHEN: Q. Fair enough.

6                       Page 281.

7                       Many years ago, it was possible for  
8       governmental bodies and prestigious  
9       organizations to gather learned  
10      scientists together and establish health  
11      standards from their collective wisdom.  
12      These standards were generally accepted  
13      by nearly everyone. Like it or not,  
14      these uncomplicated times are gone and  
15      unlikely to return. For various reasons  
16      the public no longer is satisfied with  
17      totally delegating these important  
18      responsibilities to a few people sitting  
19      in a closed meeting.

20                      Would you agree with that?

21                      DR. WHILLANS: A. Yes, I would agree.

22                      Q. Why do you think it is that the  
23      public are no longer satisfied with -- presumably, I  
24      mean, we wouldn't be here if the public were satisfied  
25      with this risk assessment happening in closed

1 delegation. Why do you think it is that they are no  
2 longer satisfied?

3 A. Well, I think you are really straying  
4 outside the area where I have any special information.

5 Q. Fine. If you feel that, then don't  
6 bother.

7 A. We are not talking just about  
8 radiation or even health standards. I think as the  
9 public is more educated, they want more involvement in  
10 making decisions.

11 Q. Do you think perhaps the public are  
12 also more concerned about the environment and health  
13 issues?

14 A. Yes.

15 Q. If we could turn to page 293, this  
16 paragraph, proper use of risk is all about  
17 compensation, and I have underlined a sentence there.

18 Therefore, it would be very desirable  
19 to avoid conflicts between risk-based  
20 factors for compensation and risk-based  
21 occupational exposure guidelines.

22 And when we were talking about causality,  
23 I suggested, if you remember, Dr. Whillans, that  
24 perhaps one of the reasons that people -- researchers  
25 shied away from causality, other than other reasons

1       which we have already discussed, was because they did  
2       not want to get into this conflict?

3               A. I remember that you said that, and it  
4       may be one reason for some people, but I don't think  
5       it's the main reason. I think it is simply that  
6       epidemiological researchers are very aware of the  
7       limitations of what a given set of data can tell them,  
8       and they are reluctant to interpret something beyond  
9       what the data will tell them.

10              Q. If you could turn to page 295:

11                      We recommend that the NCRP take the  
12                      initiative to establish a closer  
13                      interface with ICRP to assure uniformity  
14                      and consistency between ICRP and NCRP  
15                      recommendations.

16              Now, if I may just ask a question here.  
17       It seems to me that the emphasis is always on  
18       consistency and uniformity, rather than on actually  
19       monitoring and checking the other organization. It  
20       seems to me what the NCRP should be doing, what the  
21       researchers should be doing is actually checking and  
22       assessing and even challenging what other  
23       organizations -- and they should be working  
24       independently. If they are all working together then  
25       you are not really going to get a very good regulatory

1 process.

2 A. Well, I think I said that the NCRP  
3 and the ICRP are very similar in many ways. They make  
4 recommendations based on the research of others, one  
5 for the U.S. and one for an international committee,  
6 and they do have many members in common. There are  
7 NCRP members on ICRP.

8 This is one person's view. And I can  
9 think of reasons why it might be practical not to have  
10 at the level of a recommendations an unresolved  
11 inconsistency, but I can't agree that these  
12 organizations do not encourage contrary points of view.

13 Certainly ICRP, for example, is revising  
14 its risk estimates and that's a result of a different  
15 interpretation of what the evidence says. I think  
16 that's true of the general recommendations, it's true  
17 of their specific recommendations as well. They very  
18 much want to provide the best recommendations that they  
19 can given of the evidence.

20 Q. Well, if we could turn to page 296,  
21 and again I realize that this is a personal point of  
22 view, but where Saenger-- speaking, the last paragraph,  
23 if I could just read that sentence.

24 There's an old rule which says that if  
25 that if it's not broke, don't fix it.

1                   Now, wouldn't you agree that that is not  
2                   really the purpose of these research organizations.  
3                   They are supposed to be doing basic research, not  
4                   just -- to me the interpretation is, if it's not broken  
5                   don't fix it, means don't rock the boat or don't cause  
6                   any problems unless they are evident. They should be  
7                   going out and looking to see if there are problems. I  
8                   don't know what your interpretation is.

9                   A. I am sure Dr. Saenger isn't speaking  
10                  for NCRP or ICRP. This was a panel discussion  
11                  exploring issues, I guess. And that may be his view  
12                  and I haven't read the paragraph so I don't know really  
13                  the context. But I don't sense that ICRP or NCRP takes  
14                  that approach in its general work.

15                 NCRP, as I have said, produces many  
16                  reports on issues that may be inconvenient for nuclear  
17                  power industry, for a radiotherapy hospital. I think  
18                  it generally will address any issue that it feels is  
19                  important.

20                 Q. Is it not true that the NCRP are  
21                  funded by EPA?

22                 A. I don't know. I don't know where  
23                  they get all their funding.

24                 Q. Perhaps we could just go to the top  
25                  where Meinhold is speaking.



1 I would like to address a question to  
2 Bob Minogue, only in the sense that his  
3 message to us was perhaps a little  
4 different from the others in the sense of  
5 having us stay further away from the  
6 application and methodologies.

7 In other words, the NCRP are being told  
8 to stay away from the regulatory process, that they  
9 must just do the research. Is that what your  
10 interpretation is?

11 A. I really can't say based on just  
12 reading this what the reason for his saying that is. I  
13 didn't read all of the NUGs' presentation.

14 Again, I would point out that NCRP isn't  
15 doing basic research. What they are doing is  
16 synthesizing information which comes from basic  
17 research into reports and recommendations, and it may  
18 be that the NRC would like to see them take a  
19 particular direction, but I think the context of this  
20 is just what it says, it's a discussion.

21 Q. Do you think perhaps that the  
22 discussion might be revealing to an extent that it  
23 shows a certain relationship between these agencies who  
24 we are dependent upon to a large degree.

25 MS. HARVIE: The witness has not read the



1 discussion. I don't know how he could give any  
2 evidence whether it would be helpful one way or the  
3 other.

4 DR. WHILLANS: I agree with that.

5 MRS. deQUEHEN: Q. Well, on page 303...

6 THE CHAIRMAN: He has given evidence  
7 about the function of the ICRP and I think if you want  
8 to pursue that area with him, to the extent that he  
9 knows about it and how they fit into the general  
10 framework, that's all right to do that. But I think it  
11 is not very helpful to sort of go into the middle of a  
12 discussion amongst a group of people back in 1984 to  
13 really get to the meat of it. I think it is better to  
14 ask him general questions about it.

15 MRS. deQUEHEN: I will.

16 Q. It's just this last statement I want  
17 to read halfway through.

18 I think Bob Minogue, for example --

19 THE CHAIRMAN: Where are we at now,  
20 please?

21 MRS. deQUEHEN: Page 303, in the middle  
22 of the page on the right-hand side.

23 THE CHAIRMAN: All right.

24 MRS. deQUEHEN: Q. I think Bob Minogue,  
25 for example, in delineating that fact

1                   that we, first of all, want good science  
2                   from you; second, we want the reality and  
3                   perception of objectivity, a little  
4                   harder to get perhaps; and third, we want  
5                   your awareness of the problem of  
6                   implementation and, perhaps, where your  
7                   role leaves off and ours begins.

8       [12:30 p.m.]

9                   Now, it seems to me --

10                  THE CHAIRMAN: Can I just have his  
11       comment on that statement, if he has one?

12                  DR. WHILLANS: Well, I don't really have  
13       one.

14                  MRS. deQUEHEN: Q. Dr. Whillans, it  
15       seems to me, and I would like you to comment on what I  
16       am saying, that what they want from the scientists is,  
17       first of all, credibility, realizing that government  
18       agencies and regulatory agencies don't have that  
19       credibility.

20                  THE CHAIRMAN: You have got two questions  
21       in there.

22                  MRS. deQUEHEN: Well, if I could just sum  
23       it up and see if you agree with the summation. They  
24       don't want them to get entirely involved in the  
25       regulatory process. They want them to stay at a

1 distance. Third, they want them not to cause any  
2 problems when it comes to implementation.

3 You say they aren't scientists. Well, I  
4 cannot, I have not got all the names of the people on  
5 the NCRP here, but all of them are producing research  
6 in this field and all are accredited scientists.

7 MS. HARVIE: He did not say they were not  
8 scientists.

9 THE CHAIRMAN: That's right. He did not  
10 say they were not scientists.

11 MRS. deQUEHEN: Q. I'm sorry. I beg  
12 your pardon. What did you say?

13 DR. WHILLANS: A. The members of the  
14 NCRP are largely scientists and some of them are even  
15 producing basic information in their own main job,  
16 which may be at a university, for example. But their  
17 role in NCRP is not to do the basic research, it is to  
18 synthesize that information into some kind of report or  
19 recommendation. But most of them are scientists, I  
20 agree.

21 Q. Dr. Whillans, they must synthesize  
22 all their scientific efforts and the other scientific  
23 research that is available--

24 A. Yes.

25 Q. --into a scientific report.

1 A. Yes.

2 Q. They must basically work with the  
3 scientific material--

4 A. Yes.

5 Q. --according to the scientific  
6 principle.

7 A. Yes.

8 Q. At the same time, will you  
9 acknowledge that they are being told that they have a  
10 certain political role?

11 A. Well, I will agree that from time to  
12 time the users of their information may attempt to  
13 influence them in one direction or another. It might  
14 be something as benign as just suggesting more  
15 attention be paid to a particular problem than another.  
16 Or it could in some cases be a case where they are  
17 being influenced to not make certain a recommendation.  
18 I'm sure that happens. I think you have to rely on the  
19 integrity of a group like the NCRP to resist that. And  
20 that is the whole value in having an independent group.  
21 They don't have to accept every pressure that is put on  
22 them.

23 Q. But then when I asked you who  
24 actually funds them, do you not acknowledge that a real  
25 problem can arise with funding when people are being

1 funded from the industry and a lot of these people, I  
2 think, you will acknowledge are and their laboratories  
3 are being funded.

4 MS. HARVIE: That's a matter of evidence  
5 and the witness didn't know where the funding came  
6 from, as you will recall.

7 MRS. deQUEHEN: I'm talking about their  
8 own funding for their research and their laboratories.

9 THE CHAIRMAN: That is a different  
10 question in a different area. I think that Dr.  
11 Whillans' evidence was that they paid their own  
12 expenses. There might be some small, minor office  
13 expenses but the members, in fact, paid their own  
14 expenses. But he doesn't really know.

15 DR. WHILLANS: I don't really know.

16 MRS. deQUEHEN: Q. If we could turn  
17 to -- Dr. Whillans, if I may just for a moment state  
18 where I'm going, perhaps it would clarify the position  
19 if I may do that. It seems to me that we can sit here  
20 and discuss scientific details for the next months.

21 DR. WHILLANS: A. Hopefully not.

22 Q. But the problem is that the system is  
23 not entirely scientific - the regulatory system - there  
24 is an immense amount of politics involved. Would you  
25 acknowledge that?

1                   THE CHAIRMAN: Do you think you could be  
2 more specific than that, because we have been talking  
3 about the United States and an international  
4 organization which contains a number of countries. We  
5 have been talking about Ontario, and we have been  
6 talking about the Federal government. I think you have  
7 to be much more specific about the question that you  
8 want to ask him. I don't see how Dr. Whillans can  
9 answer a question as broad as that.

10                   I mean, I understand your position, and  
11 it's well recognized -- Just a minute.

12                   I understand your position. But you are  
13 here, as I told Mrs. Lawson this morning, you are here  
14 to ask questions of these witness, about what they  
15 know. You will have a chance in due course, if it's  
16 relevant, to put your position forward.

17                   But right now you are here to ask  
18 questions of these people based on their knowledge.  
19 And that's as far as they can go. I mean, your  
20 suggestion seems to be that there is some kind of  
21 influence on the integrity of the scientific community  
22 due to the people who support them and fund them. That  
23 seems to be the suggestion you are making; is that  
24 right?

25                   MRS. deQUEHEN: I am not alone.



1 THE CHAIRMAN: I am not saying you are.

2 And you may be right. But you are not going to get  
3 agreement from Dr. Whillans on that. He has told you  
4 several times he doesn't agree with that. And I think  
5 you have to let it sit there.

6 MRS. deQUEHEN: Mr. Chairman, if I may  
7 just make this point. Dr. Whillans is actually putting  
8 forward all the assessments in terms of a regulatory  
9 process. He must have mentioned ICRP at least 100  
10 times in this hearing. They are an international  
11 organization.

12 THE CHAIRMAN: Yes, they are  
13 international organization on which Hydro relies. Now,  
14 whether they are right or wrong in relying on it is  
15 something that we may have to consider. But that's  
16 their position. They believe it's a useful body, an  
17 international body which helps them determine what they  
18 have to do. Now if it's not a good organization or a  
19 bad organization, we will have to get that from  
20 somewhere else. We are not going to get it from these  
21 witnesses.

22 MRS. deQUEHEN: Well, I think that their  
23 reliance upon this organization is affecting us and  
24 being forced upon us and they must be able to show that  
25 they can support the integrity of this organization.

1                   THE CHAIRMAN: I don't think Dr. Whillans  
2     can say any more than he has already said about what he  
3     considers the nature of the organization and why he  
4     relies on it. Not only has he said it now, as you have  
5     said, he has referred to it many, many times in the  
6     course of his evidence.

7                   Now, it may be wrong. Maybe Hydro  
8     shouldn't rely on this body. I mean, that's something  
9     that may have to be dealt with later. But it's not  
10    going to help to continually try and get him to say  
11    there is something wrong with ICRP.

12                  MRS. deQUEHEN: Well, I hadn't even --

13                  DR. WHILLANS: What I would say to you is  
14    that I don't accept that ICRP represents the nuclear  
15    industry or even the radiation industry. Its  
16    membership is composed of university people, some  
17    industry people certainly, medical people; and, I think  
18    it's reputation is sound. I would agree that not  
19    everybody accepts its analysis of data, its  
20    recommendations. But we do rely on them.

21                  MRS. deQUEHEN: If we could turn to --

22                  THE CHAIRMAN: I think we should go on to  
23    something else now. We have heard enough about the  
24    ICRP.

25                  MRS. deQUEHEN: Well, I really believe

1       that they should have to defend their position if they  
2       take that position.

3               THE CHAIRMAN:   They have defended it,  
4       Mrs. deQuehen.   If you have got evidence that you want  
5       to bring about the ICRP, the time to do it is later,  
6       not now.   So I think you should go on to something  
7       else.

8               MRS. deQUEHEN:   Well, I will then just  
9       move to risk assessment generally.

10              Q.   If we could look at reference 11(A).  
11       "What are we doing when we are doing risk analysis?" by  
12       John C. Baylor and Stephen R. Thomas.

13              If you could turn to the second leaf,  
14       primary and secondary questions.   It is a  
15       characteristic of risk analysis as we broadly define it  
16       that its practitioners disagree amongst the themselves  
17       about its nature.   A definition may imply that a  
18       certain set of activities is to be expanded or  
19       contracted to meet definitional boundaries, that  
20       certain kinds of data are to be used or ignored, or  
21       that certain methods are to be used.

22              Definitions are thus likely to be one  
23       means used by astute managers, scientists, and other  
24       disputants to advance their own substantive views.  
25       That is, definitions are likely to be used as a means

1 to settle questions that are questions that other  
2 practitioners may want to keep open or to close in  
3 different ways. We recognize this problem with  
4 definitions, and we have tried to avoid it. But we do  
5 not guarantee our own success. Examples of questions  
6 which may be premature or improperly closed by  
7 definitions are, et cetera. It goes on.

8 Could I ask for your view of that  
9 analysis of risk analysis?

10 DR. WHILLANS: A. Well, I think this is  
11 really Mr. King's area. Before turning it to him,  
12 though, could I ask where did this paper come from and  
13 is there a date for it?

14 Q. It came from 1985 NCI conference.

15 A. So these are the proceedings of a  
16 conference. It's not a peer-reviewed publication.

17 Q. It is the proceedings of a  
18 conference, a workshop on low level radiation.

19 A. It is a questionable risk analysis,  
20 so maybe I would ask Mr. King for his comments.

21 MR. KING: A. I haven't read this paper  
22 and I have no comment, really, on the paragraph that  
23 you read. If this is a paper in the 1985 time frame,  
24 one comment I may add that could be helpful is that in  
25 the United States a society for risk analysis was

1 established in the early 1980s, and I was a member of  
2 that society for some time.

3 And the whole question of definitions of  
4 the various terms was a big discussion point in the mid  
5 and late 80s. They set up subcommittees to define some  
6 of these terms and I think this would be expected in  
7 that the subject of risk assessment as a field of  
8 endeavour, where people could get degrees and spend  
9 their life studying the subject of risk assessment has  
10 just really come to its own in the last 10 to 15 years.  
11 [12:45 p.m.]

12 And there was a lot of confusion about  
13 what somebody really meant when they said risk  
14 management or risk assessment or risk analysis. And  
15 without -- like I say, I haven't read this paper, but  
16 perhaps the authors are referring to some of that  
17 confusion which I know existed in the mid-80s.

18 Q. Thank you, Mr. King. If I could just  
19 perhaps ask you to turn overleaf and perhaps you could  
20 help me with this, where it says conceptual.

21 Political considerations - I have  
22 underlined it in yellow, if you see -  
23 political considerations seep in because  
24 the practical consequences of research  
25 often favour some people at the expense



1 of others, and the nature and size of the  
2 benefits and losses, as well as the  
3 identity of the winners and losers can be  
4 profoundly affected by the terms in which  
5 the debates about risk are shaped.

6 May I ask you this about it, when they  
7 are talking about the identity of winners and losers  
8 can be profoundly affected by the terms in which  
9 debates about risk are shaped, is it not fair to say  
10 what they are saying is that the consequences of your  
11 research can lead to winning and losing?

12 A. I am afraid I have no comment at all  
13 on what they are saying. I haven't read this paper,  
14 and whether that's what they meant when the author  
15 wrote this, all I can say, I guess it stands for itself  
16 what the author said.

17 Q. Over page, on page 69, the paragraph  
18 beginning Multi-Level Discourse, it says:

19 Multi-level discourse is  
20 characteristic of the diplomacy, rhetoric  
21 and poetry from which pure science has  
22 quite insistently sought to free itself  
23 after the manner of Bacon and Descartes.  
24 Risk analysis, however, even in its most  
25 scientific parts is neither all pure nor



1 all science, and multi-level discourse  
2 using contestable concepts should be  
3 expected.

4 Do you think it is legitimate for risk  
5 assessment, and by risk assessments I am not just  
6 talking about safety, I am talking also about  
7 regulation of health standards which is a risk  
8 assessment, I think you will agree, won't you, Dr.  
9 Whillans?

10 DR. WHILLANS: A. I think risk  
11 assessment goes into the standards, yes.

12 Q. Do you think it is acceptable for  
13 risk assessment to be based, and regulation of health  
14 standards to be based, on something that is less than  
15 pure science?

16 A. Well, I think it is probably  
17 inevitable. But I would point out that whenever, for  
18 example, radiation regulations are to be changed, there  
19 is a public review process, there is a consultation  
20 process, any member of society can make his comments  
21 known. There are hearings, there are many ways in  
22 which any influence that could come in from the things  
23 you are talking about here can be counteracted. It's  
24 not always easy, I agree, but it is an open process.

25 Q. Dr. Whillans, don't you think it

1 would be a better process if all the facts were laid on  
2 the table in the truest possible form, and then the  
3 judgmental decision were made. If assessments, these  
4 sort of assessments they are talking about were not  
5 built in at the stage of the regulatory process, if the  
6 actual scientific facts and all the other conflicting  
7 interests were all laid before the general public quite  
8 openly and then the judgments were made.

9 A. Well, I guess in an ideal world that  
10 would be a good process. But I think the fact is that,  
11 I certainly know that I am not aware of all the details  
12 of oncogenes and some of the things that go into the  
13 basis of determining risks. I rely on other sources of  
14 information and I think the public has to rely on  
15 sources of interpretation as well. And I guess it is  
16 important that those sources be available, and that you  
17 have some way of checking their credibility. But I  
18 think it is asking too much to expect everyone with an  
19 interest to understand every aspect of the problem.

20 Q. Dr. Whillans, do you think it's  
21 asking too much to have a regulatory process and a  
22 regulatory body that is truly independent of the  
23 industry and the conflicts of the industry such that --

24 A. I think it should be as independent  
25 as possible. Certainly it shouldn't be funded in a way

1       such that it depends upon the industry, except to the  
2       extent that if the industry isn't there there would be  
3       nothing to regulate, I guess. But I agree it ought to  
4       be independent, yes.

5                   Q. Is it not true that the ICRP actually  
6       act as a consultant to the radiological industry?

7                   A. I'm not aware of an example where  
8       that is true. I guess I am not sure exactly what you  
9       mean by a consultant. They certainly provide advice.

10                  Q. Perhaps we could move to reference  
11       11B.

12                  A. Again, could I ask you, where did  
13       this come from and what is the date?

14                  Q. It came from the same conference.

15                  A. It is in fact the next paper.

16                  Q. I would just like to ask one final  
17       question. Do you think that it is fair enough for  
18       someone who is really concerned about the process to  
19       investigate the conflicts of interest and the political  
20       forces behind the regulatory process?

21                  A. Yes, I do.

22                  Q. With regard to this paper, perhaps  
23       could you just turn to the second leaf. This is the  
24       third paragraph on the right-hand side.

25                         It might be thought that sufficient

1 information for selection of one  
2 particular model over the other would be  
3 provided by the observed dose response.  
4 However, this is often not the case as  
5 much dose response models appear similar  
6 to one another over the range of  
7 observable response rates.

8 Now, are you aware of the work of Brown  
9 who has analyzed the different dose responses?

10 A. No, I don't know Brown at all.

11 Q. Well, if we turn to page 12, he is  
12 analyzing --

13 A. Sorry, I don't have any page numbers.

14 Q. I'm so sorry. It's the third leaf.

15 A. Sorry, that one does have a number,  
16 right.

17 MS. HARVIE: I think it is actually 129,  
18 page 129.

19 MRS. deQUEHEN: Q. Well, it's the third  
20 leaf.

21 DR. WHILLANS: A. Yes.

22 Q. On the left-hand side. What he is  
23 doing is analyzing different dose response models and  
24 showing how they differ in the very low dose region or  
25 how they differ as the dose is reduced to very low

1 levels.

2 A. This is for different models applied  
3 to the same data set, is it?

4 Q. Yes.

5 A. Okay.

6 Q. They correspond fairly well at high  
7 levels, but down at low levels you see you get very  
8 different results, and it is just illustrative of the  
9 level of inaccuracy or the level of uncertainty that  
10 can be introduced at very low levels, depending on the  
11 model you use.

12 A. Yes. I mean, these models have a  
13 very different functional relationship, or functional  
14 form, rather. And yes, I would expect them to be  
15 different at low levels.

16 Maybe you are going to ask, the models  
17 that we have talked about with respect to radiation  
18 dose response are not derived only by fitting to data,  
19 because we know there are limitations in the data. It  
20 didn't take into account other things such as plausible  
21 biological mechanisms and so forth.

22 Q. On the right-hand side:

23 Comparison of virtual safe doses, VSD,  
24 leading to an excess risk of 10 to the  
25 minus 6 for various dose response

1 extrapolation models.

2 Depending on which model you have used,  
3 you can introduce, virtually safe dose will vary  
4 enormously?

5 A. Yes.

6 Q. To factors of what?

7 A. Well, in this table, somewhat less  
8 than three orders of magnitude. Sorry, I am reading it  
9 the wrong way. Three times three orders of magnitude.

10 Q. A thousandfold?

11 A. Yes.

12 Q. So it really shows the great  
13 dependence upon these models; doesn't it?

14 A. Well, yes. But again, I don't really  
15 see the relevance of this to the models we have been  
16 talking about. You are talking basically about  
17 thresholds here, I guess, virtually safe doses. It's a  
18 theoretical exercise based on a feeding study, I guess,  
19 DDT.

20 I am agree with you that through this  
21 range of six different models, you can get very, very  
22 different predictions at the low levels. But that's  
23 not really the situation we have been talking about  
24 with radiation.

25 Q. Not exactly. But it shows the type



1 of error that can be introduced with the model?

2 A. Yes, that's what it shows.

3 Q. And this information was introduced  
4 at a conference where they are looking at low dose  
5 radiation.

6 A. That may be. This particular table  
7 has to do with DDT.

8 Q. With regard to the dose conversion  
9 factors, the dose equivalent is multiplied by what is  
10 called quality factor, or the RBE, which is the  
11 relative biological effectiveness?

12 A. Actually, the dose equivalent is  
13 equal to the absorbed dose, the physical absorbed dose  
14 times the quality factor. That's what makes it the  
15 dose equivalent.

16 Q. I see. Well, the dose equivalent is  
17 dependent on what quality factor you multiply?

18 A. That's right, yes.

19 Q. If we could move to reference 15.

20 A. In the same set, 670? Mine goes only  
21 to reference 14.

22 THE CHAIRMAN: Perhaps we should break  
23 now for lunch, it would probably be a good idea.

24 DR. WHILLANS: Can you tell me the title?

25 THE CHAIRMAN: We don't have 15, though.

1 I don't have 15 either. What is 15's title? What do  
2 you think 15's title is?

3 MRS. deQUEHEN: 15's title is the Quality  
4 Factor for Tritium Radiation.

5 THE CHAIRMAN: It's not in this package.

6 MRS. deQUEHEN: Yes, that's what I have  
7 been told.

8 DR. WHILLANS: Can you tell me the  
9 author? Perhaps I have the paper.

10 MRS. deQUEHEN: H.A. Johnson.

11 DR. WHILLANS: I have it.

12 MRS. deQUEHEN: You have that?

13 DR. WHILLANS: Yes.

14 MRS. deQUEHEN: Could we proceed?

15 THE CHAIRMAN: We will adjourn for lunch  
16 now.

17 There is going to be another  
18 cross-examination after lunch; is that correct? Is  
19 that the understanding? Someone told me that.

20 MS. HARVIE: Yes, that's my  
21 understanding, Mr. Chairman. Mr. Fedorsen will be  
22 proceeding on behalf of Mr. Bourgeois.

23 THE CHAIRMAN: Is that your understanding  
24 too?

25 MRS. deQUEHEN: Yes, it is, Mr. Chairman.

1 THE CHAIRMAN: Okay. Thank you.

2 MRS. deQUEHEN: Thank you.

3 THE REGISTRAR: Please come to order.

4 This hearing will adjourn until 2:30.

5 ---Luncheon recess at 1:03 p.m.

6 ---On resuming at 2:33 p.m.

7 THE REGISTRAR: Please come to order.

8 This hearing is again in session. Please be seated.

9 THE CHAIRMAN: Ms. MacDonald?

10 MS. MacDONALD: Yes. Good afternoon, Mr.  
11 Chairman, Board members.

12 Intervenor counsel has very kindly  
13 permitted me to address you.

14 We would just like to indicate to the  
15 Board and to the panel and to Ontario Hydro counsel and  
16 Intervenors that the government will not have questions  
17 for cross-examination of this panel.

18 At the outset of the life of the panel we  
19 did have a list of concerns from the various government  
20 ministries, but we have found throughout the cross-  
21 examination which we have followed and which has been  
22 very lengthy that the cross-examination has been of  
23 assistance, and we find that a number of our issues  
24 have been addressed in the previous cross-examination.

25 There was one remaining issue that we

1       were going to cross-examine on, Mr. Chairman, and that  
2       was in the issue of avoided cost, but we have  
3       considered that and in our view it may be more  
4       appropriate to raise that issue before the next panel;  
5       that is, Panel 10.

6               THE CHAIRMAN:   Thank you, Ms. MacDonald.  
7       Mr. Campbell?

8               MR. B. CAMPBELL:   Mr. Chairman, I spoke  
9       to Mr. Fedorsen yesterday on this matter, and --

10              THE CHAIRMAN:   "This matter" being the  
11       cross-examination on behalf of Mr. Bourgeois?

12              MR. B. CAMPBELL:   This matter that I am  
13       about to address, yes, being the cross-examination on  
14       behalf of Mr. Bourgeois.

15              I have since had an opportunity of  
16       reviewing a second package of materials that has been  
17       filed and reviewing that second package of materials  
18       has, if anything, encouraged me even more to make the  
19       submissions that I intend to make and to make those  
20       submissions more strongly, and it has to do with the  
21       appropriateness of the scope of this cross-  
22       examination.

23              The materials filed demonstrate that the  
24       focus of this cross-examination is the particular  
25       allegations and claims that Mr. Bourgeois has been

1 making against Ontario Hydro for many years. The  
2 correspondence included in the first volume of  
3 materials filed goes back as far as 1985, for example.

4 These allegations and claims which are  
5 being pursued against Ontario Hydro relate to the  
6 ongoing operation of a particular facility, the Bruce  
7 heavy water plant, and in particular relate to hydrogen  
8 sulfide or H(2)S emissions from that plant.

9 Now, to put this in some context for you,  
10 hydrogen sulphide is used in the production process for  
11 heavy water as well as in a wide range of other  
12 industrial processes, including refineries, pulp and  
13 papers, smelting, tanneries, and the chemical is also  
14 naturally produced from decomposition of vegetable and  
15 animal material; hence, it is produced in manure tanks,  
16 slurry pits, and sewers, all of which often produce  
17 high concentrations of this chemical.

18 Now, Mr. Bourgeois, I should advise the  
19 Board, is represented in respect of his claims against  
20 Hydro by Lerner & Associates in London, a separate firm  
21 obviously from Mr. Fedorsen's. While actual court  
22 proceedings are not yet under way Mr. Bourgeois through  
23 Lerner & Associates continues to press his claims  
24 against Ontario Hydro in contemplation of litigation.

25 As the Board can see from the original



1 package of material filed, there has been extensive  
2 effort and information reviewed by Hydro, the Ministry  
3 of the Environment and the AECB in relation to Mr.  
4 Bourgeois' claims in an attempt to deal with them in as  
5 fair a manner as possible. For instance, there have  
6 been consultants doing work for the AECB on modelling  
7 methods in relation to plumes from the heavy water  
8 plant, Agriculture Canada on farming methods; the  
9 University of Guelph was asked to examine farming  
10 practices and lambing practices with respect to Mr.  
11 Bourgeois' operation. Epidemiological studies have  
12 been undertaken by Dr. Slana, again doing a study of  
13 Mr. Bourgeois' farm, and Ontario Hydro has prepared a  
14 response to a report which I think was prepared by a  
15 Dr. Lumbley and is referred to in certain of the  
16 material proposed to be filed.

17 In other words, there is a wide scale of  
18 investigations going on and have been for many years in  
19 relation to the matters raised by Mr. Bourgeois and  
20 which, as I emphasize, have been the subject and  
21 continue to be the subject of claims against Ontario  
22 Hydro being made by Mr. Bourgeois.

23 Now, it is Ontario Hydro's position that  
24 in terms of the issues relevant to this application  
25 before you the ongoing claims being asserted by Mr.



1       Bourgeois are not probative of any issue before the  
2       Board and that the specifics of one individual's  
3       dealings are not useful in a planning hearing relating  
4       to the choices and options that are open to the  
5       province with respect to long-term planning of  
6       electricity facilities.

7               THE CHAIRMAN:   You are not suggesting, I  
8       take it -- perhaps I shouldn't interrupt you in the  
9       middle of your submission, but you are not suggesting  
10      that generic questions relating to hydrogen sulphide  
11      and its effect on areas surrounding a heavy water plant  
12      are not relevant?

13             MR. B. CAMPBELL:   No.   I think, Mr.  
14      Chairman, we would agree that what would be useful to  
15      the Board is the ability of Ontario Hydro to meet  
16      regulatory limits that have been established with  
17      respect to hydrogen sulphide, the results achieved  
18      against those limits and matters of that type, and it  
19      is that kind of evidence that has been called about  
20      various of the options, including --

21             THE CHAIRMAN:   Well, perhaps broader than  
22      that because it might be a contention that the limits  
23      aren't sufficiently low or strict, however you describe  
24      it.

25             MR. B. CAMPBELL:   There might be, Mr.

1 Chairman. As I say, I think in the first instance,  
2 what we have tried to do is to show that there is a  
3 full regulatory process in place, limits have been  
4 established, and that there is compliance with those  
5 limits, and to try and give where we have expertise on  
6 the panel some understanding of the effects of the  
7 major concerns with respect to that particular option.

8 I should say in that regard, we have no  
9 one on this panel who is qualified in that regard with  
10 respect to hydrogen sulphide as an emission. For  
11 reasons that we have often said here, we don't have  
12 expertise in every particular area and every  
13 conceivable question on each panel.

14 THE CHAIRMAN: You certainly knew about  
15 Mr. Bourgeois' concern and that he was going to be here  
16 today.

17 MR. B. CAMPBELL: Absolutely, Mr.  
18 Chairman. And we have taken the position from the very  
19 beginning and we have answered all kinds of  
20 interrogatories and provided all kinds of information  
21 in that regard, but we have taken the position from the  
22 very beginning that the details of Mr. Bourgeois'  
23 particular situation are not a matter that should be  
24 inquired into by this Board.

25 We have taken that at funding, we have

1       taken it consistently, we have advised Mr. Bourgeois of  
2       that position regularly.

3                       And we do say that this is not the proper  
4       forum for Mr. Bourgeois to be pursuing his claims  
5       against Hydro or for the Board to make some  
6       determination as to whether Mr. Bourgeois has been  
7       fairly or unfairly treated by Ontario Hydro, the  
8       Ministry of the Environment or the Atomic Energy  
9       Control Board.

10                      We say the Board should not involve  
11       itself in disputes of this type, particularly when it  
12       is clear that specific allegations made are being  
13       actively addressed by the relevant provincial and  
14       federal agencies.

15                      Also, and in particular, we say that this  
16       Board should not indulge parties who come before you in  
17       order to pursue private claims against proponents, and  
18       any doubt that this was the underlying purpose of this  
19       intervention was answered for me late yesterday when,  
20       after speaking to Mr. Fedorsen, I arranged to have sent  
21       to me the second package of material, which he  
22       indicated had been delivered to Hydro midday yesterday.  
23       I had that delivered to my home last night, and that  
24       package contains correspondence in relation to Mr.  
25       Bourgeois' claim that was sent on a without prejudice

1 basis from Hydro's counsel on the matter to Lerner &  
2 Associates.

3 Now, in my submission -- and Lerner &  
4 Associates, I would remind the Board, is Mr. Bourgeois'  
5 counsel who has been acting for him in pressing this  
6 claim against Ontario Hydro.

7 Now, in my submission, the filing of that  
8 correspondence would be improper by any standard. It  
9 was without prejudice discussions in order to try and  
10 resolve a claim that was being made, and it should not  
11 have been produced, and it should not be received by  
12 this Board.

13 It is my submission that both that  
14 correspondence, in fact all the other correspondence  
15 and reports which relate to Mr. Bourgeois' claims  
16 against Hydro, should not be received into evidence by  
17 this Board and that no cross-examination should be  
18 permitted on those matters.

19 It is my submission that Ontario Hydro is  
20 entitled to some protection against what, in my  
21 submission, is a clear abuse of the process in pursuit  
22 of the claim being asserted by Lerner & Associates on  
23 Mr. Bourgeois' behalf.

24 Finally, as I say, there is a separate  
25 matter.

1                   While Mr. Johansen can speak, I think, to  
2           the general regulatory framework that exists with  
3           respect to the operation of the Bruce heavy water  
4           plant, we say that there is no reason why in a planning  
5           hearing of this type that we should be required to  
6           provide any expert testimony, nor have we got an expert  
7           on this panel who can deal with the specifics of this  
8           situation, and that is the position that has been  
9           communicated to Mr. Bourgeois regularly, as I  
10          understand it.

11                   THE CHAIRMAN: Well, Mr. Bourgeois is a  
12          party to this hearing and has been granted party  
13          status, so he in that sense is on equal footing with  
14          any other party to the hearing. He happens to have a  
15          claim against Ontario Hydro, but you are not submitting  
16          that that should preclude him from participating in  
17          this hearing?

18                   MR. B. CAMPBELL: No, nor have I said  
19          that in any submission, Mr. Chairman.

20                   THE CHAIRMAN: No, I realize that. I  
21          just want to make it clear on the record.

22                   I think you said in the generic sense the  
23          questions that would be relevant for any other party to  
24          ask it would be appropriate for him to ask or his  
25          counsel to ask.



1 MR. B. CAMPBELL: Quite, Mr. Chairman.

2 My objection is to any questions which would tend to  
3 assist in the pursuit of his claim against Ontario  
4 Hydro, and I certainly take strong exception to any  
5 effort to produce without prejudice correspondence in  
6 relation to this matter.

7 THE CHAIRMAN: I take it that point, and  
8 I will come to that in a moment. But, for instance, it  
9 is questions about the effect of - I hope I have it  
10 correctly - hydrogen sulphide or something?

11 MR. B. CAMPBELL: Hydrogen sulphide, yes.

12 THE CHAIRMAN: Yes. Questions about  
13 hydrogen sulphide could be asked. It is a product of  
14 the heavy water operation, and so questions about Hydro  
15 sulphide emissions and their effect is certainly a  
16 relevant area of examination; would that not be right?

17 MR. B. CAMPBELL: I think we would not  
18 say that is all an irrelevant area. That's correct.

19 THE CHAIRMAN: No. And if no one on this  
20 panel can completely answer it, then of course it will  
21 have to be dealt with in the same fashion other things  
22 like that have come up; they have to be done by means  
23 of undertaking or something of that sort.

24 MR. B. CAMPBELL: That's correct.

25 THE CHAIRMAN: Now, I don't know. It is



1       certainly possible that some of the answers that were  
2       received in that general area might be of assistance to  
3       Mr. Bourgeois in his collateral claim against Ontario  
4       Hydro, but are you saying that the questions are ruled  
5       out because of that?

6                   MR. B. CAMPBELL: Well, I have been  
7       through the material that has been proposed for filing,  
8       Mr. Chairman, and a great amount of that --

9                   THE CHAIRMAN: Well, I am going to go  
10      through that with you in a moment because I want to  
11      know what specifically you think should be out. Before  
12      I hear from Mr. Fedorsen about it I would just like to  
13      know what of these two volumes, what you say should be  
14      out and what can still stay in.

15                  MR. B. CAMPBELL: I think, generally  
16      speaking, all of the correspondence that relates to Mr.  
17      Bourgeois' claim should not be permitted.

18                  THE CHAIRMAN: But there are experts'  
19      reports, for example. What about those?

20                  MR. B. CAMPBELL: There are certain  
21      experts' reports that have been given in interrogatory  
22      answers. I obviously have no difficulty with those.

23                  There is a report that Mr. Bourgeois has  
24      prepared that has been funded, which in my submission  
25      is very particular to his situation. There is nobody

1 on this panel who can speak to it, and there has been a  
2 response prepared by Ontario Hydro. And I have no  
3 objection to the response being filed, but we have no  
4 one here who can -- it has, I think, just been  
5 available and I don't believe that there is anyone here  
6 who can speak to it. I have no objection to that being  
7 filed.

8 As I say, there is a range of  
9 interrogatory answers that have been provided. I don't  
10 have any particular concern about those being filed  
11 except to the extent that certain of the  
12 interrogatories -- all right, I think there were some  
13 interrogatories, I don't think they are included in  
14 this package. There were some interrogatories that  
15 were requesting all correspondence, minutes of  
16 meetings, et cetera, that related to Mr. Bourgeois'  
17 claim, and we of course refuse to answer that. I don't  
18 think that is a matter of contention. I haven't seen  
19 it in the package, so I think that in the general  
20 categories you have is where my concerns lie.

21 THE CHAIRMAN: Okay. Perhaps we should  
22 go through and just make sure that we are clear as to  
23 what it is you think, for instance, that should be in  
24 and should be out so that we don't have any  
25 misunderstanding. The first volume contains 51 items.

1                   MR. B. CAMPBELL: Well, let me just go  
2                   through. I think -- certainly it appears to me that  
3                   items 1 through 12 have been produced, and they have  
4                   been produced in the context of pursuing this claim. I  
5                   am not familiar enough with item 13 to know exactly  
6                   what it is about.

7                   THE CHAIRMAN: Well, No. 1, we have had  
8                   that - No. 1, the statement of concerns - on record for  
9                   some time.

10                  MR. B. CAMPBELL: I'm sorry, No. 1, the  
11                  statement of concerns. I am really picking up at No.  
12                  2. I apologize.

13                  I assume that Item No. 13 is intended to  
14                  be the basis for some questions on cross-examination.  
15                  Where it came from and whether or not we would be able  
16                  to provide any answer on that I have no idea. I  
17                  suspect not, looking at it, but it would be typical of  
18                  the kind of material that has been put to witnesses in  
19                  cross-examination and asked if they knew anything about  
20                  it. I think the answer in this case would be "no",  
21                  but, in any event, obviously I am not going to take  
22                  exception to that for normal cross-examination  
23                  purposes.

24                  I would object to, as I understand it,  
25                  15, 16 -- I'm sorry, 14 as well. I'm sorry was reading

1 the tab after. 14, 15, 16, 17 --

2 THE CHAIRMAN: The rest are  
3 interrogatories, and they are already part of our  
4 record for better or worse.

5 MR. B. CAMPBELL: That is correct. I  
6 think that interrogatories take us right through to --

7 THE CHAIRMAN: Volume 2, 56? And 56 is  
8 the letter that you particularly object to, I think.

9 MR. B. CAMPBELL: That's right. 56, in  
10 my submission, should not be received. I assume, if I  
11 have got my tabs right, that 58 is again simply a  
12 scientific paper that is intended to be used for some  
13 purposes in cross-examination.

14 The next item is, as I understand it, a  
15 page simply giving some information on toxicity of  
16 H(2)S. I believe it was part of our Exhibit 519 used  
17 in direct. I can't very well object to that.

18 And I think then we get into some sort  
19 of...

20 My next page is a page that shows  
21 Tiverton Monitor, five parts per billion, per division,  
22 and behind that I have page 2 of something. I'm not  
23 sure what the page 2 is of, but it obviously is a  
24 report...

25 THE CHAIRMAN: I was looking at the

1 index. It indicates a report of Dr. Edwards in  
2 response to Dr. Lumbley's report.

3 MR. B. CAMPBELL: All right. Well, I  
4 guess given the reference to Dr. Lumbley's report, and  
5 that is a Hydro report that responds to Dr. Lumbley's  
6 report done by Hydro's Research Division, and I don't  
7 take any objection to that going in, although again I  
8 can advise the Board it has been fairly recently  
9 produced and I don't think we have anyone on the panel  
10 that can speak to it.

11 THE CHAIRMAN: Well, we can cross that  
12 bridge when we come to it, if we have to.

13 MR. B. CAMPBELL: Yes. Yes.

14 THE CHAIRMAN: Mr. Fedorsen?

15 MR. FEDORSEN: Let me assure you that,  
16 first of all, Mr. Bourgeois is not here to advance any  
17 claim of his own.

18 [2:55 p.m.]

19 He is here to ask questions, some of them  
20 are specific, but generally speaking they are general  
21 questions with respect to emissions. Emissions that  
22 are produced in the production of heavy water which is  
23 central to the operation of the Bruce nuclear power  
24 plant.

25 The questions will impact on emissions as



1 they occur in other types of energy production  
2 processes, because what we have, very simply put, is we  
3 have a gentlemen, Bourgeois, who has been complaining  
4 for a number of years that his family, other people  
5 adjacent to his property, as well as his livestock have  
6 been affected by hydrogen sulphide emissions. Those  
7 emissions are generated as a by-product of the  
8 production of heavy water, and this witness panel has  
9 already gone on record as telling this Board about what  
10 levels are safe, what levels of emissions of hydrogen  
11 sulphide there have been, and I can particularize the  
12 evidence as I continue, if necessary. They have  
13 created an impression with respect to the health risks  
14 of hydrogen sulphide emissions and they have done that  
15 through the filing of their exhibit which is our tab  
16 58. And all we are attempting to do here, in a  
17 nutshell --

18 THE CHAIRMAN: Are you saying tab 58 is a  
19 Hydro exhibit?

20 MR. FEDORSEN: Yes, it is.

21 THE CHAIRMAN: In this hearing?

22 MR. FEDORSEN: Yes.

23 THE CHAIRMAN: I see.

24 MR. B. CAMPBELL: That's the one that I  
25 identified as a page out of our direct testimony, Mr.



1 Chairman.

2 MR. FEDORSEN: Basically what we are  
3 going to ask questions about, if we are permitted, is  
4 the witnesses - and I must say I am privileged to even  
5 to be able at some point, I hope, to ask them a couple  
6 of questions if there is anything left here after my  
7 friend's submission - about their attitudes towards  
8 safety. I then propose to ask them questions about the  
9 monitors.

10 The correspondence that is in here has  
11 nothing to do with, as I say, claims and so on. My  
12 friend yesterday phoned me up and indicated this was a  
13 feud between Ontario Hydro and Mr. Bourgeois. The  
14 questions will not be put in that way in any way, shape  
15 or form.

16 THE CHAIRMAN: One letter at least - I  
17 haven't looked at them all - one letter at least is  
18 directly related to the claim.

19 MR. FEDORSEN: I will deal with that in a  
20 moment.

21 On the first series of correspondence,  
22 that would be Exhibits 2 - I think basically to it  
23 looks - to about 6, those questions have to do with  
24 responses that had been made as to the monitor readings  
25 from which Hydro bases its claim that levels are

1 reasonable around the Bruce heavy water plant. And my  
2 questions will be directed directly and specifically to  
3 what the monitor readings mean.

4 The next series of exhibits, the reports  
5 will indicate reports that, if we are allowed to call  
6 evidence at some stage in these proceedings, we have  
7 some world class experts that will testify that some of  
8 the things that are in those reports will establish in  
9 their minds that there is an effect that could be - and  
10 I underline the word "could" because we are not here to  
11 decide anything definitively - but it could be related  
12 to hydrogen sulphide emissions. And that's the purpose  
13 of those reports and that would be the tenor of the  
14 questions that we will put the witnesses in that  
15 regard.

16 My friend is indicating they are going to  
17 be able to answer any of them, I don't know how he can  
18 say that when he hasn't heard the questions. In any  
19 event, if they can't answer them, that is fine. The  
20 record will be that they don't have a position on this  
21 or they can't tell us no and on we will go with the  
22 questions.

23 The only point that I could see my friend  
24 having some consideration from this Board on is the  
25 so-called without prejudice letter. I looked at that

1 and agonized over it because I knew this was what was  
2 going to happen given Hydro's description of this  
3 intervenor as being involved in a so-called feud.

4 I would not be asking nor would I want to  
5 put the letter in for any other purpose, if you look at  
6 the letter, Mr. Chairman, and Board members, you would  
7 see -- I'm sorry?

8 THE CHAIRMAN: He doesn't want us to look  
9 at the letter.

10 MR. FEDORSEN: You have to look at it  
11 before you make a ruling, Mr. Chairman, that's the way  
12 it works.

13 THE CHAIRMAN: I have the same  
14 difficulty, I can't rule on whether something is  
15 admissible or not without seeing what it is.

16 MR. FEDORSEN: That's right. It's  
17 unfortunate.

18 Anyway, before you look at it, so my  
19 friend doesn't think that somehow we are taking unfair  
20 advantage of Hydro, there is one point that is relevant  
21 and that is this, there is a suggestion put in that  
22 letter with respect to monitor readings, I am not going  
23 to get anything else, I am not going to get into any  
24 so-called negotiation or settlements, I couldn't care  
25 less, that's for somebody else to do in some other

1 city. I think Mr. Lerner is from London. I think all  
2 that deals with is at some stage Hydro was talking in  
3 good faith, no doubt, towards the idea of relocating  
4 Bourgeois. I don't care about any of that and this  
5 Board shouldn't be concerned about that. My friend is  
6 right in that regard.

7 What I care about is Hydro's position on  
8 the monitor readings, because I think by the time we  
9 are finished with this process this Board is it going  
10 to find out what you are being told about the monitors  
11 isn't necessarily exactly what those monitor readings  
12 really mean. And to back up that proposition from this  
13 cross-examination we hope to be able to call at some  
14 stage an expert on hydrogen sulphide reactions, that  
15 would be Dr. Riffenstein from the University of  
16 Alberta, and Dr. Lumbley who is a world class  
17 aerodynamics professor who would give this Board some  
18 understanding of how dispersions occur from the  
19 emissions that are produced, not just were hydrogen  
20 sulphide, but with all kinds of other electricity  
21 generating methodologies.

22 So that that sort of evidence might lead  
23 this Board to consider whether or not the present  
24 production of heavy water at Bruce is economical, if  
25 it's totally safe, as everyone hopes that it is, and it

1        might leave this Board to consider whether Hydro's  
2        position regarding future planning, regarding future  
3        energy sources should be looked at in the context of  
4        continuing, particularly Bruce. Maybe shifting the  
5        facility, there is another plant up there, plant D, you  
6        might want to consider those types of options.

7                        These things are not specific to  
8        Bourgeois apart from the fact that Bourgeois just  
9        happens to live there. But these are generalized  
10       health concerns and that's the reason why, in my  
11       submission, he was giving funding as intervenor here  
12       and given funding to get Lumbley to make a report so we  
13       could help this Board look at the problem of emissions  
14       and see whether or not one side's position is correct  
15       or another side's position is correct without  
16       necessarily determining it.

17                      For that reason, I suggest that it is  
18       absolutely premature to foreclose Mr. Bourgeois from  
19       attempting to make some points with the panel. If  
20       questions are improper, I am certainly in this  
21       Board's -- I will certainly follow the guidance of this  
22       Board, and in particular Your Lordship who has many  
23       years' experience dealing with procedural matters, and  
24       in particular with whether or not the questions that I  
25       put are proper or improper.



1           THE CHAIRMAN: I think I detect from your  
2       submissions that you understand two things: One, that  
3       this is, in a sense, a generic hearing and not a  
4       site-specific hearing, and I think you appreciate that,  
5       and secondly, that in general you accept Mr. Campbell's  
6       main submission that this hearing is to assist this  
7       Panel make the decisions it has to make and is not to  
8       be used as a forum to assist your client in the claims  
9       he is making against Hydro. I think you understood  
10      both those points.

11           MR. FEDORSEN: I think I do, and I hope I  
12      do. But let me go further and give you this factual  
13      context as well.

14           To my knowledge there are no lawsuits  
15      against Hydro --

16           THE CHAIRMAN: I don't want to go into  
17      that. There is certainly an outstanding claim which is  
18      being pursued.

19           MR. FEDORSEN: Outside of here.

20           THE CHAIRMAN: How it winds up is not  
21      something that we are concerned with.

22           MR. FEDORSEN: Absolutely. It doesn't  
23      concern me and it wouldn't concern this Board, and I  
24      wouldn't waste your time, not one second, in advancing  
25      that.



1 ---Off the record discussion.

2 THE CHAIRMAN: Mr. Campbell, we have all  
3 agreed that that the letter which is No. 56, the  
4 without prejudice letter should not be a part of this  
5 proceeding.

6 We are prepared to hear you in reply and  
7 any other submissions that were made by Mr. Fedorsen.

8 Mr. Shepherd? My goodness, I didn't  
9 expect to hear from you.

10 MR. SHEPHERD: Mr. Chairman, I came all  
11 the way down to the hearing room to make a couple of  
12 brief comments on this point when we heard it was  
13 coming up, and I will be brief.

14 I should advise the Board that both IPPSO  
15 and the Coalition of Environmental Groups have made  
16 clear to Hydro and on the record since the funding  
17 hearing, the original funding hearing, that we are  
18 specifically relying on Mr. Bourgeois with respect to  
19 hydrogen sulphide issues, and we specifically did not  
20 ask for any funding and did not take any steps in this  
21 regard because he was dealing with it.

22 THE CHAIRMAN: Well, I think Mr. Campbell  
23 acknowledges that those kind of questions can be asked  
24 of the panel.

25 MR. SHEPHERD: And that leads to the

1 second question, and that is: The result of Hydro's  
2 submission, as it appears to us, is that we can talk  
3 about hydrogen sulphide or anything else for that  
4 matter, in a vacuum, as long as it's a general  
5 question, but as soon as Hydro actually harms somebody  
6 with an emission or anything else, than we cease to be  
7 able to talk about it.

8 The necessary result of Mr. Campbell's  
9 submission, and particularly his agreement with you  
10 that Mr. Fedorsen can ask any question that I could  
11 ask, is that I could not ask the question, for example,  
12 "Mr. Penn, isn't true that last week your heavy water  
13 plant killed 700 sheep."

14 THE CHAIRMAN: No, I don't understand Mr.  
15 Campbell's position to be anything like that at all.

16 Mr. Campbell's position, and I think Mr.  
17 Fedorsen agrees with it, and I understand he does, is  
18 that this process cannot be used to assist Mr.  
19 Bourgeois in what may be another hearing. But with  
20 that understanding this hearing can hear anything that  
21 is relevant to the issues that we have to deal with.

22 MR. SHEPHERD: My concern, Mr. Chairman,  
23 and perhaps you have already answered me and if so tell  
24 me to sit down.

25 My concern is that no cross-examiner, and

1 I guess it's going to apply to people cross-examining  
2 us later, be restricted from asking questions about  
3 specific incidents that relate to specific people's  
4 claims solely because they are specific and are  
5 relating to specific claims.

6 If the incidents or the issues that they  
7 raise could have an effect on this Board's decision, it  
8 would appear to me that that ends the matter totally.

9 That's the only submission I would make.

10 THE CHAIRMAN: I have learned over a long  
11 period of time that you deal with specific issues at  
12 specific times, and if there are other matters that  
13 come up later in the context with another client and  
14 another matter, then we will have to deal with it at  
15 that time.

16 MR. SHEPHERD: Thank you, Mr. Chairman.

17 THE CHAIRMAN: Mr. Campbell, do you have  
18 any reply submissions?

19 MR. B. CAMPBELL: No, thank you, Mr.  
20 Chairman.

21 ---Off the record discussion.

22 THE CHAIRMAN: Mr. Campbell, we are  
23 prepared to proceed on the basis of the material that's  
24 been filed except for the one exclusion and we will  
25 deal with the questions as they come up.

1 I think we have tried to, and I think  
2 there is substantial agreement on the parameters of the  
3 cross-examination, but if things stray one way or the  
4 other, in either way, then we can deal with that as it  
5 comes up.

6 MR. FEDORSEN: Thank you, Mr. Chairman.

7 Just before I begin the questions, Mr.  
8 Chairman, with respect to tab 1 -- first of all, could  
9 we get that marked as an exhibit, those two packages?

10 THE CHAIRMAN: Perhaps we should have the  
11 books marked as two succeeding exhibits and then you  
12 can refer to the tabs in each exhibit.

13 MR. FEDORSEN: Thank you.

14 THE CHAIRMAN: The next exhibit, please.

15 THE REGISTRAR: The first one, the large  
16 one is 675.

17 THE CHAIRMAN: And then the second one?

18 THE REGISTRAR: It will be 676.

19 THE CHAIRMAN: Thank you.

20 ---EXHIBIT NO. 675: Submissions on behalf of Eugene  
21 Bourgeois.

22 ---EXHIBIT NO. 676: Supplementary Materials for Eugene  
23 Bourgeois.

24 MR. B. CAMPBELL: Mr. Chairman, can I  
25 take it then that the correspondence that was provided  
to me behind tab 56 in Exhibit 676 will not be given to

1 the Board, will not be distributed by my friend? We  
2 have waived no privilege with respect to that  
3 correspondence.

4 THE CHAIRMAN: We can take it out and  
5 return it to Mr. Fedorsen, if you like.

6 MR. FEDORSEN: You can leave it there for  
7 now. I will get it later, if that's all right.

8 Let me just, while that's being done,  
9 make a correction to tab No. 1, which would be Mr.  
10 Bourgeois' statement of concerns. That would be at  
11 page 6, and in the middle paragraph there we tried to  
12 give a history of this problem here with the emissions  
13 and the monitor readings, and you will see in the  
14 middle of page 6 we had indicated that had AECB also  
15 supports Hydro's contention despite strong evidence to  
16 the contrary. That position should now be corrected as  
17 a result of tab 17, and this is what my friend Mr.  
18 Campbell referred to as this very recent study now by  
19 Hydro, looking at what we have been contending about  
20 the monitors for a long time, and on page 4 you will  
21 see that this is a letter from Mr. Monbourquette from  
22 Hydro to the Atomic Energy Control Board. It indicates  
23 that:

24 We are a little distressed that the  
25 AECB has not taken a position on this

1 matter. We accept that you wanted us to  
2 examine and report our comments on this  
3 issue, however your failure to take a  
4 position has suggested that you accept  
5 Dr. Lumbley's position as being valid.  
6 We therefore request that you advise us  
7 if you in fact continue to believe that  
8 there is some question as to the validity  
9 of the current licensing basis of the  
10 Bruce heavy water plant.

11 And with that letter that we just  
12 received, actually May 7th, our position in the  
13 statement of concerns is now incorrect. Page 6 should  
14 change such that it looks like the jury is out on the  
15 Hydro position at least insofar as the AECB is  
16 presently concerned with this issue on the monitors.  
17 So I would ask that that be corrected.

18 THE CHAIRMAN: I was not following you.  
19 What is the correction?

20 MR. FEDORSEN: That's page 6, Mr.  
21 Chairman, it says in the middle paragraph:

22 The AECB also supports Hydro's  
23 contention, despite strong evidence to  
24 the contrary.

25 That should be changed. The AECB doesn't



1        seem to have taken a position on this at this time now..

2        They are considering it afresh.

3                    MR. B. CAMPBELL:   Mr. Chairman, that in  
4        my submission is simply not correct.

5                    All that the Ontario Hydro author of this  
6        letter is saying is that they would like the AECB to  
7        take a position on the Lumbley report.

8                    It's certainly our understanding of the  
9        AECB position that the licensing basis for the plant is  
10       now, was and remains perfectly adequate.

11                   MR. FEDORSEN:   I am sure that's their  
12       position, but in black and white they are saying advise  
13       us --

14                   THE CHAIRMAN:   I don't want to argue  
15       about that.   I don't think we want to argue about it  
16       any more.

17                   MR. FEDORSEN:   I agree.

18                   THE CHAIRMAN:   I have just stroked the  
19       sentence, the entire sentence out so it stands as  
20       neutral statement.

21                   MR. FEDORSEN:   Fair enough.

22        CROSS-EXAMINATION BY FEDORSEN:

23                   Q.   Now, I can begin with Mr. King.

24                   Mr. King, I happened to get a chance to  
25       review some of your evidence.   This would be at Volume

1 122, I believe - I don't know in these are pages or  
2 not - 21298. We advised the Registrar that we might be  
3 asking about this.

4 I will give you a moment there, Mr. King,  
5 it's not a contentious issue, I don't think.

6 MR. KING: A. What was that page number  
7 again.

8 Q. 21298, sir.

9 A. I have that page.

10 Q. All right. I will just wait for the  
11 Board members.

12 For the sake of expediency, I am not  
13 going to quote you verbatim unless your counsel wants  
14 me to, but if we look down at the question about  
15 whether you are convinced about Hydro plants being  
16 operated safely, the gist of your evidence, sir, was  
17 that you were convinced on the basis, amongst other  
18 things, that there was a strong safety culture and  
19 there was an open debate, I took it to mean, within  
20 Hydro. Is that a fair reading of your evidence in that  
21 regard?

22 A. That's fair.

23 Q. Fair?

24 A. Fair.

25 Q. So, you would agree with me, taking

1       that as our threshold point that, because none of us  
2       live in a perfect world, obviously sometimes accidents  
3       can happen but also sometimes mistakes and judgment can  
4       occur, but that if you have got those parameters they  
5       will be corrected, I guess, as fast as they can given  
6       that kind of attitude; is that fair, too, sir?

7                     A. That's fair.

8                     Q. Would it also be the case that in  
9       terms of the mistakes that could happen, they could be  
10      based sometimes on limited knowledge at the time as  
11      opposed to say negligence; that is, to say the state of  
12      technical knowledge and science advances through the  
13      years; is that fair?

14                    A. I think that's, in general, fair.

15                    Q. But that the keynote, one of the  
16      keynotes - and let me just say this to all the panel  
17      members now - I have had a chance to read your evidence  
18      and I am convinced that all of you, and I don't want to  
19      that take anything otherwise of any of questions are  
20      very, very concerned about public safety and your  
21      answers are reflective of that throughout what I have  
22      see.

23                    But getting back to you, Mr. King, the  
24      keynote here would be debate, an open debate, really a  
25      pursuit of the truth; would that be fair?

1 [3:15 p.m.]

2 A. I think what I was referring to when  
3 I made that statement in my direct evidence was that  
4 certainly in my experience, working in the safety area  
5 for about 15 years in Hydro, that I have never been  
6 constrained from bringing up points of contention, and  
7 I am not aware of other people being constrained, that  
8 some people have views of something is adequate or not  
9 adequate, we can talk about them in a very professional  
10 manner within Ontario Hydro. That's what I was  
11 referring to.

12 Q. That's the keynote of the scientific  
13 approach, you don't close your mind up if you don't  
14 have to unless you are convinced by evidence, agreed?

15 A. That's generally fair.

16 Q. And the idea is we keep our minds  
17 open so that we don't get in a position of locking  
18 ourselves into a point of view, because you would agree  
19 it's very difficult to change our perspective once we  
20 have made up our mind.

21 A. Well, I think the responsible  
22 approach is to keep your mind open with respect to any  
23 new evidence.

24 Q. Sure. Keep your mind open. And by  
25 my change now to Mr. Johansen. Mr. Johansen, I was

1 listening to what your counsel, Mr. Campbell, talked  
2 about in his submissions to the Board. He basically  
3 said, I took it, that you weren't an expert on hydrogen  
4 sulphide, is that correct?

5 MR. JOHANSEN: A. That's true.

6 Q. But you would have in your position  
7 at Hydro, I take it, done extensive reading in the area  
8 to keep yourself abreast of what hydrogen sulphide is  
9 all about and how dangerous it can be to people.

10 A. I have done some reading, yes.

11 Q. Is there somebody in Hydro, apart  
12 from the structure of these hearings that we should be  
13 better addressing our questions to on this issue, sir?

14 A. Well, I can simply confirm that I am  
15 not an expert on H(2)S. There are people in Ontario  
16 Hydro that work with the heavy water production  
17 operation and the environmental control of that  
18 operation on a day-to-day basis. I am in the design  
19 and construction branch, or what used to be called the  
20 design and construction branch, and it has been a  
21 number of years since I was involved in the  
22 environmental impact assessment of facilities at the  
23 Bruce site, at which time I had incidental involvement  
24 in the assessment of the heavy water plant expansion.

25 I say "incidental" in that I happened to

1 be sitting next to the person who was, in fact,  
2 coordinating that assessment. And we shared a good  
3 deal of information for efficiency reasons. And it  
4 being an operational facility, it has been for many  
5 years, it is not a part of Ontario Hydro's operation  
6 which I have day-to-day involvement with.

7 Q. My question was, was there someone we  
8 should better have been putting our questions to on the  
9 issue of hydrogen sulphide than you, and I take it from  
10 your answer you are saying, indeed, there is someone.  
11 Who would that be, sir?

12 A. I'm not sure I can necessarily  
13 identify the best person.

14 MR. B. CAMPBELL: Mr. Chairman, I think  
15 we need to know what the question is. Are we talking  
16 about toxicity? Are we talking about design of the  
17 plant?

18 THE CHAIRMAN: That's right. I think you  
19 should ask the questions and see if they can answer it.  
20 If they cannot answer it and it is a proper question,  
21 they will get the information for you.

22 MR. FEDORSEN: I was just going to try to  
23 see if I could cut a lot of this out. But if I can't,  
24 let's do it this way.

25 Q. Mr. Johansen, at Volume 122, and this



1 would be, my page reference is 21319, sir.

2 MR. JOHANSEN: A. Yes, I have it.

3 Q. You have testified -- I'll wait till  
4 the Board members get this. You have testified, back  
5 on March the 25th, about hydrogen sulphide and  
6 emissions in the production of heavy water. The gist  
7 of your evidence, as I understood it, was this: that  
8 most of the hydrogen sulphide is stripped from heavy  
9 water and that once that heavy water is produced, you  
10 get some of the hydrogen sulphide back through a  
11 recycling process, is that fair?

12 A. Yes.

13 Q. And you are familiar with that  
14 process yourself, sir?

15 A. In a general sense.

16 Q. And thereafter, at some stages there  
17 is a flare stack; is that right?

18 A. Yes.

19 Q. And that at the heavy water plant,  
20 hydrogen sulphide is converted to sulphur dioxide, is  
21 that right?

22 A. Through the combustion at the flare  
23 stack, yes.

24 Q. And sulphur dioxide is a less toxic  
25 gas,

1       you told us, than hydrogen sulphide?

2                   A. That's our understanding, yes.

3                   Q. When you said that it was less toxic  
4       back on March 24th, what did you mean, sir?

5                   A. Well, I was relying on the fact that  
6       the Ministry of the Environment's air quality criterion  
7       for SO(2) is considerably higher than the air quality  
8       criterion for H(2)S.

9                   I was also relying on general advice from  
10       people in Ontario Hydro that the literature, both from  
11       the Ministry of the Environment and elsewhere,  
12       indicated a lower level of concern or a lower toxicity  
13       level with SO(2) than with H(2)S and that that was part  
14       of the rationale for the conversion at the flare stack.

15                   I am not implying that there is no toxic  
16       effect possible from SO(2). There certainly are at  
17       certain concentrations, and SO(2) is an emission that  
18       we need to control just as H(2)S and other emissions.

19                   Q. As you decrease the emissions of the  
20       hydrogen sulphide as it is burned off, do you increase  
21       the emissions of sulphur dioxide?

22                   A. Yes. It's from the combustion of  
23       H(2)S that the SO(2) arises.

24                   Q. So in principle, do I understand this  
25       right, that no matter what I do, once I start flaring

1 off the hydrogen sulphide, if I want to get rid of the  
2 worse of the two evils I create something that is still  
3 bad, sulphur dioxide, is that right?

4 A. That is the process.

5 Q. So there's no real way, it's just  
6 structurally to avoid the escape of one of two toxic  
7 gases, although one is less toxic than the other.

8 A. Well, the whole system, with the  
9 flare stack being the end point, is intended to  
10 minimize emissions to begin with.

11 Q. Obviously. I'm not saying it isn't.

12 A. And once the H(2)S is at the point of  
13 discharge and is flared through the combustion process,  
14 the result is concentrations of H(2)S and SO(2).  
15 Primarily SO(2) and residual H(2)S if the combustion  
16 process is not 100 per cent effective, is residual  
17 concentration in the environment. And the purpose of  
18 our monitoring network around the site is to ensure  
19 that the concentrations in the environment are within  
20 prescribed limits.

21 Q. We'll get to that in a minute. But  
22 just on the flare stack, if you wouldn't mind educating  
23 me a little further. Is there steam that goes into the  
24 flare stack in this combustion process? And if there  
25 is, is this steam super-heated.

1 A. Steam? Not that I am aware of.

2 Q. That would come as a surprise to you?

3 A. I'm just not aware that there would  
4 be steam.

5 Q. You did, though, do a fair bit of  
6 consulting with other people at Ontario Hydro in  
7 preparation for your evidence at this panel, did you  
8 not?

9 A. Some.

10 Q. So despite whatever preparation, you  
11 did as much as you could do given all the things you  
12 people all had to do in terms of preparation, the  
13 super-heated steam would be a surprise to you; you  
14 hadn't heard about that?

15 A. No, it's not a surprise to me. It  
16 wouldn't surprise me that there would be some steam. I  
17 guess when you first asked the question I had a  
18 different image in mind.

19 There would, I would expect, be some  
20 steam. And one of the reasons that we introduce  
21 propane is to ensure maximum combustion at the point of  
22 discharge to compensate for either low concentration of  
23 the H(2)S or the presence of other materials that might  
24 act to inhibit the combustion process.

25 Q. Would you happen to know now that I

1 have got you on to this steam point, whether that steam  
2 in and of itself is hot enough to ignite the gases that  
3 are present?

4 A. No, I couldn't comment on that.

5 Q. Would you know what an OH radical is?

6 Does anybody, can anybody --

7 A. I am not a chemist.

8 Q. Dr. Whillans?

9 DR. WHILLANS: A. I know what an OH  
10 radical is but I don't think I'll be able to help you  
11 much further.

12 Q. Could you just explain what an OH  
13 radical is, please?

14 A. Well, it's a species containing one  
15 oxygen and one hydrogen, and it has an unpaired  
16 electron which makes it very reactive.

17 Q. All right. Are you finished with the  
18 answer?

19 A. Yes.

20 Q. If I could go back to Mr. Johansen,  
21 or maybe Dr. Whillans, if you could help out, would  
22 either of you know if OH radicals are produced in this  
23 flaring-off process in the attempt to get rid of the  
24 hydrogen sulphide gas?

25 MR. JOHANSEN: A. I am not familiar with

1 the details of the products of combustion at the flare  
2 stack. I am aware that there was an analysis of the  
3 combustion conditions carried out a number of years  
4 ago, I believe it was in conjunction with safety  
5 analysis of the Bruce "B" reactor.

6 It was of some concern, or at least  
7 Ontario Hydro was carrying out some analysis of a  
8 scenario in which H(2)S gas might enter the ventilation  
9 ports on the Bruce "B" plant and somehow effect the  
10 safety of operators. And that was the context of it.  
11 But I don't have the detailed knowledge of that.

12 Q. All right. That's fair enough. And  
13 it's probably a long time ago?

14 A. Yes, that was several years ago.

15 Q. And there has been nothing done in  
16 terms of analysis or tests of hydrogen sulphide since  
17 that report a few years ago, am I right on that?

18 A. I wouldn't be able to say. There was  
19 an analysis, I think of it as the Bruce heavy water  
20 plant risk analysis, which I believe we provided to  
21 your client in response to 9.21.1. It sticks out in my  
22 mind because it was the very first document provided.

23 Q. Did you have anything to do with the  
24 preparation of the responses on some of those  
25 interrogatories, Mr. Johansen? I guess you were



1 - consulted, were you?

2 A. Virtually none.

3 Q. You just remember the number?

4 A. Of course. I reviewed the  
5 interrogatory materials in preparing for this.

6 Q. Let's get back to this flaring-off  
7 process. Just to recap your evidence without reading  
8 it through, you have testified before this board, in  
9 effect, the typical emissions from Bruce include both  
10 sulphide dioxide, and your words were small amounts of  
11 hydrogen sulphide either from two processes, incomplete  
12 combustion, or you said leaks at various points in the  
13 process. I'm not concerned with leaks here, sir.  
14 Nobody is perfect and nobody should be accountable for  
15 accidents that are uncontrollable. But your words  
16 were, small amounts of hydrogen sulphide.

17 [3:29 p.m.]

18 You went on and said: Most of the  
19 hydrogen sulphide is recovered, except for controlled  
20 releases.

21 Does that mean that in situations wherein  
22 the hydrogen sulphide isn't recovered you are  
23 controlling that process; you time it, you control it?

24 A. In situations where the releases are  
25 associated with deliberate activities such as the

1 shutting down of a plant these sort of releases I would  
2 call planned and controlled.

3 Q. Do those generally --

4 A. There are upset conditions obviously  
5 that can occur where I wouldn't necessarily -- we may  
6 be able to control those depending on what the  
7 situation is, but I wouldn't necessarily call those  
8 controlled releases.

9 Q. Dealing with the so-called controlled  
10 releases do those occur at generally speaking specific  
11 times each year in the Hydro plants across Ontario?

12 A. Mr. Daly might be able to add  
13 something here, but it is not my observation of the  
14 data that there is a particular seasonality to it.

15 Q. All right. Taking you still back to  
16 the evidence, you had introduced, I think through your  
17 counsel, an exhibit that was actually Exhibit 519,  
18 which has -- I think it was page 50 of 519, and that  
19 exhibit is filed in Mr. Bourgeois' materials at tab 59,  
20 sir.

21 A. Well, in my copy it turned up under  
22 tab 58.

23 Q. Oh, sorry. Did I say 59? 58, yes.

24 What you had said at points relevant to  
25 this exhibit was that the evidence indicates to us that

1 death in humans and domestic animals occurs rapidly at  
2 500 parts per million.

3 It indicates: There are no serious,  
4 irreversible health effects in humans or domestic  
5 animals from exposures to about 100 parts per million  
6 for up to an hour.

7 That was your evidence and you stand by  
8 that?

9 A. That is still my understanding from  
10 the work that had been done in conjunction with the  
11 heavy water plant risk analysis which I referred to a  
12 moment ago and from what I have seen and been advised  
13 of as information coming out of the recent  
14 international conference on H(2)S toxicity, which was  
15 held in Alberta in 1989.

16 Q. Did you read all those excerpts?

17 A. No, I didn't. So again, I relied  
18 largely on the advice of the people who had made a more  
19 careful study of those proceedings and the literature  
20 in general.

21 Q. So somebody in Hydro made a careful  
22 study of those proceedings?

23 THE CHAIRMAN: Well, I think if you have  
24 got questions to ask him about it, ask him, and see how  
25 he does.

1 MR. FEDORSEN: I just want to know really  
2 if somebody did?

3 THE CHAIRMAN: Well, I think you can ask  
4 him -- ask him the questions you want to ask him. I  
5 mean, I don't think you need to ask him the last  
6 question.

7 MR. FEDORSEN: All right. Fair enough.

8 Q. What did you mean when you talked  
9 about "serious, irreversible health effects", sir?

10 MR. JOHANSEN: A. Well, I was referring  
11 to the table, the summary chart, and looking at that  
12 chart I was relying on interpretation of data from the  
13 literature which was summarized in that chart, which I  
14 guess I could describe my understanding in general  
15 terms as, serious health effects would be physiological  
16 effects that would last for some time after the  
17 exposure were to end. Whereas, what I was referring to  
18 here in general were the sort of effects that would  
19 disappear very soon after or as soon as the exposure  
20 ends.

21 Q. Fair enough. We can all read the  
22 chart and I am not going to take you through it again.  
23 I will come back to it at times if I am allowed to.

24 But just this point: Would anyone in  
25 your view, from what you know of hydrogen sulphide,

1 ever recommend exposure in the range of let's say 1,000  
2 parts per million for let's say five seconds? Is that  
3 something that we should be recommending people do? Or  
4 would you know?

5 A. Well, again a non-expert opinion  
6 based on the data that Ontario Hydro has used for risk  
7 analysis would suggest no, that would not be  
8 recommended.

9 Q. But is there therefore some data for  
10 1,000 parts per million for five second exposures, or  
11 are you just using common sense and extrapolating back?  
12 Because this graph seems to be based on effects timed  
13 out to an hour.

14 A. Yes, and this is simply a summary  
15 chart, and really, in order to do a proper risk  
16 analysis one would have to look, I would think, at the  
17 information that indicates the potential toxic effect  
18 based on time of exposure, effect being some product of  
19 level or concentration of the contaminant to the  
20 concern, at times the duration.

21 And in the heavy water plant risk  
22 analysis I believe there was data of that sort, and it  
23 is with that kind of concentration time/duration  
24 relationship in mind that I say that clearly exposure  
25 to levels of 1,000 ppm for certainly periods of an hour

1 or somewhat less than an hour would be -- definitely to  
2 be avoided.

3 I can't conceive of a situation that  
4 would anticipate an exposure of that sort.

5 Q. So, do I understand this right, that  
6 1,000 parts per million even for one, two, three, four,  
7 five seconds is something you sure wouldn't recommend?  
8 Would it be safe to say you sure wouldn't recommend  
9 exposures to 100 to 300 parts per million for periods  
10 of up to five seconds? That is something you wouldn't  
11 want some friend of yours to do; is that fair?

12 A. Well, that is not quite as easy an  
13 answer.

14 I would, as a general rule, not recommend  
15 undue exposure of humans or environment to contaminants  
16 that can be prevented by practical means.

17 Q. Sure. Let me give you another  
18 situation that seems apparent from the literature. And  
19 when I look at your chart, if you are let's say walking  
20 through a field with a concentration cloud of say 100  
21 to 300 parts per million - something you wouldn't  
22 recommend, I already understand that - but am I right  
23 to say that you would smell it for an instant but  
24 because hydrogen sulphide knocks out your ability to  
25 smell, after you smell it you might not know you are in



1 it; is that fair?

2 A. At certain concentrations that could  
3 be true, yes.

4 Q. Well, at any concentration over what;  
5 do you know the answer?

6 A. Not off hand, but I'm sure that we  
7 could provide it.

8 Q. Where would you get it from?

9 A. Again, the information that we used  
10 in carrying out that risk analysis. I might also add  
11 that - this is probably relevant - for worker safety  
12 purposes around the heavy water plant the --

13 THE CHAIRMAN: Mr. Johansen, is the heavy  
14 water risk analysis an exhibit; do you know?

15 MR. JOHANSEN: I don't recall if it got a  
16 number.

17 MR. FEDORSEN: It is in an interrogatory.

18 MR. JOHANSEN: It is certainly an  
19 interrogatory, yes, 9.21.1.

20 THE CHAIRMAN: That has already been  
21 entered, I think.

22 MR. B. CAMPBELL: That's where it can be  
23 found, Mr. Chairman.

24 THE CHAIRMAN: All right. Thank you.  
25 And, Mr. Johansen, does this deal with all this area in

1 which Mr. Fedorsen was talking to you about?

2 MR. JOHANSEN: It contains, Mr. Chairman,  
3 information on -- and rationale for levels which are  
4 considered to be threshold levels for significant human  
5 health effect and refers to literature that that data  
6 is drawn from, as far as I can recall.

7 To the specific question of what level at  
8 which the sense of smell is affected and perhaps  
9 removed, my chart in Exhibit 519 does indicate that.  
10 In the line or the entry opposite the 100 to 150 part  
11 per million level I noted that amongst other symptoms  
12 associated with that level is the loss of smell.

13 MR. FEDORSEN: Q. So the bottom line is,  
14 if I am walking into the wind with a heavy  
15 concentration pocket say of plus 150 parts per million  
16 for four or five seconds I might not smell that gas for  
17 more than a second or so because it might numb me right  
18 out; it is that dangerous, isn't it?

19 MR. JOHANSEN: A. Well, all of the --

20 MR. B. CAMPBELL: Dr. Johansen, just a  
21 minute.

22 Mr. Chairman, from acting on these kinds  
23 of matters before I know full well that that kind of  
24 question is not a simple question. It requires plume  
25 analysis; it requires all sorts of things. And I would

1 just like Dr. Johansen to be sure that he understands  
2 fully, because I don't, the basis on which that  
3 question has been asked.

4 To me a question that simply says if I am  
5 walking into the wind and some of this stuff comes  
6 toward me is not an adequate basis to provide any  
7 answer that would be of any use to the Board.

8 THE CHAIRMAN: Well, surely it is  
9 established from this table that this is a toxic  
10 substance and the matter of degree may not be that  
11 significant. I mean, that is --

12 MR. B. CAMPBELL: We don't take any  
13 argument with the fact that it is a toxic substance. I  
14 make a great deal of concern about my friend's  
15 question, that the way this stuff moves through the  
16 environment is not uncomplicated, and if he is going to  
17 posit a question to it I think it is to him to lay a  
18 ground work for that. Otherwise, the question in my  
19 submission or the answer, if given, would have  
20 absolutely no value to it at all.

21 THE CHAIRMAN: Well, you don't score any  
22 marks at this hearing, Mr. Fedorsen, by catching people  
23 out, I can tell you that.

24 MR. FEDORSEN: I am not trying to, Mr.  
25 Chairman.

1 THE CHAIRMAN: I am not suggesting you  
2 are. I am just telling you that that is the situation.

3 MR. FEDORSEN: First of all, I take  
4 actually exception to counsel sometimes answering the  
5 questions for the witness. The witness said -- I put a  
6 simple question, 150 to 300 parts per million, it can  
7 be pretty dangerous. Simple question, common sense.

8 THE CHAIRMAN: He said he thought it  
9 could be.

10 MR. FEDORSEN: Yes.

11 THE CHAIRMAN: And I think that is the  
12 answer. I don't think you need to go any farther than  
13 that.

14 MR. FEDORSEN: I wasn't. I don't  
15 understand the objection.

16 THE CHAIRMAN: All right. Go on to  
17 something else, then.

18 MR. FEDORSEN: All right.

19 MR. JOHANSEN: Mr. Fedorsen, perhaps I  
20 should complete my response to that.

21 All of the symptoms which I could refer  
22 to with reference to this table are for an exposure  
23 duration of one hour so it was in that context that I  
24 presented the figure 100 to 150.

25 MR. FEDORSEN: Q. I understand that,

1 sir.

2 MR. JOHANSEN: A. So whether you walk  
3 into that concentration upwind or downwind, you know,  
4 if that is the concentration then the literature that  
5 we are aware of would suggest that if you were to  
6 remain exposed to that level for a period of an hour  
7 then the sense of smell would be affected.

8 Q. That chart, I have taken it from your  
9 evidence, and correct me if I am wrong, was prepared  
10 off the study that Hydro did in 1984, June of '84, and  
11 that reference is the interrogatory. I think my date  
12 on that is right. Is that fair?

13 A. That sounds about right, yes.

14 Q. And this conference on toxicity of  
15 hydrogen sulphide, that was in 1989?

16 A. Yes.

17 Q. Okay. I think both the conference  
18 and your report agree on one thing, and that is that  
19 the effects on humans with respect to the severity of  
20 hydrogen sulphide is dependent on three factors: one  
21 was the concentration, the second was the duration of  
22 the exposure, and the third was the sensitivity of an  
23 exposed individual. Would you agree with that?

24 A. That sounds reasonable. I have no  
25 problem with that, in general.

1 Q. Sure. It makes sense to me, too.

2 Tell me this, are the effects of hydrogen sulphide  
3 exposure cumulative?

4 A. I would say that at the --

5 THE CHAIRMAN: I will warn if you Mr.  
6 Campbell won't. This is, I think, a very difficult  
7 question and be sure you know the answer before you  
8 give it.

9 MR. JOHANSEN: Well, I can't answer the  
10 question of cumulative effects. All I was going to say  
11 was that at the sort of levels that we believe our  
12 emissions are at in the environment the effects are not  
13 considered to be of irreversible harm.

14 MR. FEDORSEN: Q. What you are trying to  
15 say is, despite the Chairman's word of caution, is you  
16 are really trying to tell us you don't think they are  
17 cumulative, aren't you?

18 MR. JOHANSEN: A. Well, I can't  
19 really -- one can't necessarily jump from the point  
20 that I have made to the question of a cumulative  
21 effect.

22 Q. They might be and they might not be;  
23 right? That might be the state of where the science on  
24 hydrogen sulphide is presently at?

25 A. I'm not a health physicist.



1 Q. Fair enough.

2 A. And I have to limit my response to  
3 what I feel I can stand behind.

4 Q. I appreciate your candor, sir.

5 A. What I can -- and I guess I derive my  
6 satisfaction with our operation on the basis that I  
7 know the operation has been the subject of review by  
8 the regulatory authorities for a long time, and I am a  
9 strong believer in an open and fair review process, and  
10 I trust that in due course all issues will be resolved.

11 Q. What are you talking about? What  
12 issues?

13 [3:47 p.m.]

14 A. Well, it's a matter of record, and I  
15 have testified that there are concerns about odour,  
16 complaints about odour, and there is under way, a  
17 review of the risk assessment. And I guess in general,  
18 I am saying that we -- at least I don't see any closing  
19 of minds around Ontario Hydro with regards to  
20 environmental or safety issues. But there is an  
21 ongoing review of the scientific understanding of the  
22 relationship between emissions and effect.

23 THE CHAIRMAN: I wonder, could we take  
24 the break right now, take our afternoon break?

25 Break for 15 minutes.

1 THE REGISTRAR: Please come to order.

2 This hearing will recess for 15 minutes.

3 ---Recess at 3:50 p.m.

4 ---On resuming at 4:05 p.m.

5 THE REGISTRAR: Please come to order.

6 This hearing again in session. Be seated, please.

7 THE CHAIRMAN: As everyone knows, there  
8 is a bit of a time problem with respect to the  
9 completion of the evidence of this panel.

10 I remind those again that don't perhaps  
11 remember that I will not be able to be here between  
12 eleven thirty and at least two o'clock tomorrow  
13 afternoon.

14 My experience has always been that if you  
15 extend hearing time, that people have a way of filling  
16 that time so you don't really gain that much, but we  
17 are prepared to sit tonight to 5:30 if you think you  
18 can substantially finish your cross-examination within  
19 that time.

20 MR. FEDORSEN: I can tell you, Mr.  
21 Chairman, I timed this out, I thought I would be three  
22 hours, we lost a half an hour with objections, I have  
23 been an hour now.

24 THE CHAIRMAN: So you are not far off.

25 MR. FEDORSEN: Not far off. I don't

1 think I can do it, but I will try.

2 THE CHAIRMAN: I have admonished every  
3 other Hydro panel and I will admonish this one, that,  
4 please, just answer the questions that you are asked.  
5 You don't have to do anything more than that. No one  
6 expects anything more than that.

7 MR. FEDORSEN: Thank you. Shall I go  
8 ahead?

9 THE CHAIRMAN: And if you don't finish,  
10 don't worry, but have a shot at it anyway.

11 MR. B. CAMPBELL: Mr. Chairman, it's been  
12 many months since I have been able to speak to my  
13 witnesses in that regard, but I do want you to  
14 understand that this is a sentiment that is  
15 occasionally expressed to them before they go on the  
16 stand.

17 MR. FEDORSEN: Q. Mr. Johansen, we left  
18 you off, if we just come back to this business of the  
19 debate again.

20 Again, let's be clear with each and with  
21 your colleagues here. There is no doubt in Bourgeois'  
22 mind or mine, that if there was a problem that you  
23 think is developing in Hydro, you are guys are going to  
24 jump on it. We are not at issue on that.

25 I am just going to explore with you

1 really the state of knowledge of this gas that we are  
2 putting out into the atmosphere and we are going to see  
3 if, in fact, there is any problem there on the  
4 evidence. All right? So if we can confine ourselves  
5 to that.

6 If we can go on from your last series of  
7 answers, you had referenced these toxicity studies of  
8 hydrogen sulphide that were done in a conference in  
9 1989; correct? You made reference to those.

10 MR. JOHANSEN: A. Yes.

11 Q. Those were also referenced in the  
12 interrogatories and Hydro conceded, and I am not going  
13 to reference them, that they were familiar with those  
14 studies but they hadn't done any formal critiques on  
15 them, agreed?

16 A. That's my understanding.

17 Q. And Riffenstein, you have heard of  
18 him, he was one of the editors of these proceedings on  
19 the international conference on hydrogen sulphide  
20 toxicity, would you concede from what you know he is an  
21 expert in the field of hydrogen sulphide emissions?

22 MR. B. CAMPBELL: Mr. Chairman, Mr.  
23 Johansen has said that he is not an expert in this  
24 area.

25 THE CHAIRMAN: If Mr. Johansen knows he

1 will yes; if he doesn't know, he will say, I don't  
2 know.

3 MR. JOHANSEN: All I know is that he is  
4 one of the co-editors of the proceedings of that  
5 conference.

6 MR. FEDORSEN: Q. All right. You have  
7 had a chance to look at some of the exhibits that we  
8 put in earlier, and I would reference you, please, sir,  
9 to tab 57. This is an article by a gentlemen by the  
10 name of Roth and Hannah, they were at this conference.

11 And incidentally, Hydro sent someone off  
12 to this conference, didn't they? Mr. Gillies?

13 MR. JOHANSEN: A. I don't know.

14 Q. You don't know?

15 A. It wouldn't surprise me, though.

16 Q. I am just curious, let's assume I am  
17 right and Gillies goes to the conference.

18 THE CHAIRMAN: First of all, does anybody  
19 know who Mr. Gillies is? Mr. Johansen?

20 MR. JOHANSEN: Could you give me a first  
21 name?

22 MR. FEDORSEN: Q. Cal.

23 MR. JOHANSEN: A. Cal Gillies, no.

24 Q. Senior Health Assistant at the heavy  
25 water plant -- physicist, sorry?

1                   A. Well, that might be true. I am not  
2 intimately familiar with the health physics staff at  
3 the heavy water plant.

4                   DR. WHILLANS: A. I don't believe there  
5 is a senior health physicist at the heavy water plant,  
6 is there?

7                   Q. I may have him mislabeled, I am just  
8 trying to assist in who he is.

9                   A. I am quite sure there isn't a Cal  
10 Gillies in health and safety.

11                  Q. In any event, no one knows him and it  
12 doesn't matter.

13                  I asked you a while ago about the  
14 cumulative effects of hydrogen sulphide. Let me ask  
15 you this now, and then I am going to reference you to  
16 this article, and I am not trying to set you up or  
17 trick you or anything like that. I am going to  
18 reference the first and the second page. If you want  
19 to take a minute to read it, go take the minute because  
20 I don't want you to think I am trying to trap you.

21                  MR. JOHANSEN: A. Well, I am not sure  
22 that my reading it will get us very much further. I am  
23 not a health physicist as I indicated before. Perhaps  
24 it would be more time efficient if you were to take me  
25 to the point.



1 Q.. Let me ask you a specific question  
2 then, sir.

3 Would you agree that levels lower than 50  
4 parts per million can produce - that's of hydrogen  
5 sulphide gas - can produce many adverse effects on  
6 humans? And if you want the answer according to Roth,  
7 if you go to page 140, you will see it right in the  
8 middle of the paragraph, it says:

9 It's been established that  
10 concentrations greater than 700 parts per  
11 million are rapidly fatal and levels  
12 lower than 50 parts per million can  
13 produce many adverse effects.

14 Does that seem plausible to you?

15 A. Plausible, and I think indicated in  
16 the chart that I referred to in direct evidence. But  
17 exposure time is an important factor.

18 Q. Your direct evidence on point was  
19 specifically that there -- I am reading at page 21321,  
20 it indicates:

21 There are no serious irreversible  
22 health effects in humans or domestic  
23 animals from exposure to about 100 parts  
24 per million for up to an hour.

25 Would you concede that, this conference

1 being held in '89, your reports and your graphs from  
2 which you gave your evidence back in March 24th, being  
3 compiled from information in 1984, specifically the  
4 month of June is the date that we have, that because  
5 science changes and gets wiser every day, that may be  
6 it's the case that we have got a problem at 50 parts  
7 per million.

8 MR. B. CAMPBELL: Just a minute, Mr.  
9 Chairman. The point referenced gives a citation  
10 immediately following, Beacham et al, 1984, which would  
11 probably shed some light on what is meant by adverse  
12 effects. I think if my friend is going to put this to  
13 the witness, he is under an obligation to produce that  
14 paper.

15 It's clear that this author is relying on  
16 that paper. If we are going to deal with this, let's  
17 deal with the original source.

18 THE CHAIRMAN: This paper is not  
19 evidence. It's only used to assist the examiner to  
20 question the witness.

21 I think that page 50 seems to set out the  
22 effects, and certainly there are adverse effects there  
23 in the 50 to 100 range.

24 MR. FEDORSEN: These documents pretty  
25 well speak for themselves. And I hope that at some

1 stage this Board is going to get to hear from Dr.  
2 Riffenstein and maybe someone else, so I don't want to  
3 beat this to death.

4 Q. I just want to establish with you,  
5 sir, that to be fair, science being what it is, in  
6 particular on the issue of hydrogen sulphide, knowing  
7 that it is pretty difficult to do tests on humans  
8 because no one wants to test them with these poisonous  
9 gases, that there is a lot that we don't know about  
10 hydrogen sulphide; is that a fair comment?

11 MR. JOHANSEN: A. I don't pretend to  
12 know everything about H(2)S myself.

13 Ontario Hydro relies largely on the  
14 scientific community and the regulatory agencies to  
15 prescribed environmental control limits, air quality  
16 criteria in this case, and from time to time if those  
17 criteria change, then Ontario Hydro's policy would be  
18 to comply with those changes.

19 Q. You would have to comply. But this  
20 get back to this open debate and really the attitude of  
21 Hydro towards safety. You seem to have said in your  
22 last response that you rely on the scientific community  
23 and regulatory bodies. Is there some onus that you  
24 think is on Hydro to check these problems yourself; in  
25 other words, you should be the proactive people,

1 hunting down potential problems of public safety, or do  
2 you think there an onus in this regard, sir?

3 A. I accept that there is some onus to  
4 not simply follow, but to lead as well, and I believe  
5 our record indicates that in many areas of our  
6 operation that we indeed do lead. So, as I indicated,  
7 we do rely on ongoing review of the literature and the  
8 positions taken by the regulatory authorities.

9 Q. But dealing with one of the factors  
10 that you say Hydro relies on, and that is the  
11 scientific community, I think the Chairman pointed out,  
12 if you look at this table on 140, 141 of Exhibit 57, it  
13 tells us that we have got some not good effects in  
14 terms of chronic exposure - and I will underline the  
15 word chronic, I appreciate that we might be dealing  
16 with apples and oranges sometimes, but that's at  
17 concentrations that are under 100 parts per million,  
18 that's the scientific community that you want to rely  
19 on right; correct?

20 A. That's what this is saying. I am not  
21 sure from this excerpt what exactly is meant by adverse  
22 effects. That could cover quite a range of things.  
23 But I accept that is what the article says.

24 Q. And I am going to suggest to you that  
25 the article is also suggesting as part of the

1 scientific community, having these exchanges of  
2 information in conference style, that there is some  
3 concern from some scientists in terms -- in particular,  
4 of exposures even of 10 parts, 10 parts per million to  
5 developing organisms. Would you agree with that?

6 A. I can't comment.

7 THE CHAIRMAN: Can you point to where  
8 that is stated?

9 MR. FEDORSEN: I will point you, sir, to  
10 the middle of page 139, that strongly suggests the  
11 central nervous system is a major target - are you with  
12 me?

13 THE CHAIRMAN: Yes.

14 MR. FEDORSEN: You come down two  
15 sentences:

16 Developing and/or immature organisms  
17 are particularly susceptible to the  
18 adverse effects of most toxins.

19 Q. That's something, Mr. Johansen, that  
20 you wouldn't dispute?

21 MR. JOHANSEN: A. It sounds reasonable.

22 Q. Sure. And if we talk... One second  
23 here, I have lost my place.

24 So if from that position that sounds  
25 reasonable, that developing organisms could be



1 particularly susceptible, if you as a scientist, Mr.  
2 Johansen, were to find out that in close proximity to  
3 one of our Hydro plants there were in one particular  
4 instance prolonged labour in some ewes that were a  
5 couple of miles away, and that there appeared to be  
6 abnormalities in the newborn lambs, other factors  
7 aside, would you think that that could make you  
8 suspicious that one of the causes of those  
9 abnormalities could be, amongst many hundreds maybe,  
10 hydrogen sulphide exposure?

11 A. Well, it would certainly cause me to  
12 examine what the possible causes might be. I mean,  
13 it's already been pointed out that there is a process  
14 under way to do just that.

15 Q. We will get to that in a few minutes.

16 I have gave you a reference at one stage  
17 about 10 parts per million and human children, human  
18 babies. I am going to give you that specific reference  
19 in a moment, just let me ask you this question. I  
20 think the evidence will demonstrate that at 10 parts  
21 per million we don't know the answers on people who  
22 might be pregnant, but would you agree that there might  
23 be a real risk of abnormal brain development at levels  
24 of hydrogen sulphide exposure of 10 parts per million,  
25 sir?



1 MR. B. CAMPBELL: Mr. Chairman --

2 THE CHAIRMAN: I'm sorry, if he doesn't  
3 know the answer he can say he doesn't know.

4 MR. JOHANSEN: I really can't comment on  
5 that, again not being a health physicist.

6 MR. FEDORSEN: Q. Sure, if you go to tab  
7 12, sir, again this gets us to this idea which everyone  
8 is going to agree with that scientists want to exchange  
9 information and keep an open mind. This is a report to  
10 Bourgeois from Dr. Riffenstein, and again I hope he is  
11 going to be a witness. One of the reasons that I am  
12 putting these questions to the panel, members of the  
13 Board, is so that we can get their response in  
14 anticipation of Riffenstein.

15 If you look down the bottom of page 1,  
16 sir, of tab 12, Riffenstein says that:

17 The prolonged labour you have observed  
18 in some of the ewes is likely a direct  
19 consequence of hydrogen sulphide  
20 exposure.

21 Then he goes on, I am not going to read  
22 it, everyone can read for themselves. He concludes,  
23 talking about a failure of milk let down immediately  
24 after the birth of lambs could also be ascribed to the  
25 blockade of the action of oxytocin.

1                   You are not going to disagree with that.

2           You are not in a position to go disagree. He may be  
3           wrong, he might be right, but you can't tell us one way  
4           or the other. Am I right on that, Mr. Johansen?

5                   MR. JOHANSEN: A. No, I certainly can't.  
6           I can only observe that the words that Dr. Riffenstein  
7           has used are conditional.

8                   Q. Yes, I appreciate that.

9                   If you go to page 2 at the top, sir.  
10          This is where I am getting my comment on the plus 10  
11          parts per million for human exposures, Riffenstein  
12          talks -- I think that's where I am getting it, am I?

13                   Yes. There are also two reports of human  
14          newborn babies having movement and posture weakness,  
15          but he says that is speculation. But he concludes in  
16          that paragraph there is a very real risk of abnormal  
17          brain development and you told us you can't disagree  
18          with that; am I right?

19                   A. Well, I can't agree or disagree. I  
20          simply can't comment on it.

21                   MR. PENN: A. I would like to comment  
22          that there is several other reasons for prolonged  
23          labour in sheep, in ewes, that I have personal  
24          experience of. One is of them is known as ring worm  
25          and there is very little you can do about it, and I am

1 sure that Mr. Bourgeois knows about that.

2 Q. Mr. Penn, if I might follow this up  
3 with you. If you had, let's say this problem, in a  
4 flock, that is possibly consistent with hydrogen  
5 sulphide emissions. And again I am not ascribing any  
6 fault to anyone, this is a system that's developed to  
7 produce hydroelectricity, maybe this is the system  
8 that's going to benefit millions of people in Ontario,  
9 it's something that we have got to do. We have got to  
10 burn off these emissions.

11 But if you had this flock and if I told  
12 you that there were veterinarian reports indicating  
13 that that particular cause that you suggested didn't  
14 exist, would you then zero closer in to hydrogen  
15 sulphide problem?

16 A. I was only commenting that there were  
17 other reasons for prolonged labour, that's all.

18 Q. I appreciate that. But if you follow  
19 it up --

20 A. I wasn't doubting that hydrogen  
21 sulphide may have an effect. I was just saying there  
22 is other reasons.

23 Q. Just from a common sense perspective,  
24 you don't have to be a scientist, you might start  
25 looking at that a little closer?

1                   A. There is all sorts of reasons for  
2 prolonged labour, in addition to ring worm there is  
3 malpresentation of the animal, there is all sorts of  
4 reasons.

5                   Q. Okay. And you would want to  
6 eliminate that or at least get closer to studying that  
7 problem to make any sort of scientific conclusion.

8 [4:25 p.m.]

9                   A. I am simply observing knowledge from  
10 my own experience.

11                  Q. And maybe if I can to go Dr. Whillans  
12 on this. If we had this evidence, if this Commission  
13 were going to hear evidence about flocks being abnormal  
14 and the like or in close proximity of where there might  
15 be hydrogen sulphide emissions, would you think that a  
16 reasonable thing to do would be to study the flock from  
17 Hydro's perspective?

18                  DR. WHILLANS: I'm sorry, you said if  
19 this Commission --

20                  Q. Sorry, if this Board.

21                  A. Could you repeat it again?

22                  Q. We heard some evidence later on down  
23 the road that every time there was a hydrogen sulphide  
24 emission on the present monitoring system, the lambing  
25 went askew and when there were no emissions the lambing

1 got better and we showed that in evidence, what would  
2 you think, Doctor, that Hydro's position should be if  
3 that were the state of the world?

4 A. Well, I guess you are asking me  
5 strictly as a sort of statistical question if somebody  
6 is shown a correlation, is it worth looking for the  
7 cause if it's an important effect. And I couldn't  
8 disagree with that.

9 Q. Okay. Thank you.

10 So, I guess I'll still stay with you, Mr.  
11 Johansen. Just in conclusion in this aspect, we can't  
12 say definitively, one way or the other, whether even  
13 apparently low-level concentrations of hydrogen  
14 sulphide, one to, say, 10 parts per million might not  
15 have a dramatic effect on developing organisms. We  
16 can't say it one way or the other so far as you know?

17 MR. JOHANSEN: A. I certainly wouldn't  
18 be able to say one way or the other. I would rely on  
19 the advice of those who are experts or responsible for  
20 regulating our operations.

21 Q. And following up, sir, with your  
22 evidence in chief, you went on back in March to tell us  
23 about -- what you said at 21321 was effects below this  
24 level, referencing 100 parts per million, tend to be  
25 limited to things like irritation of the eyes and the



1       respiratory tract. That's not entirely accurate given  
2       your last response because the effects could also be  
3       effects on developing organisms; you have conceded  
4       that, am I right?

5                   THE CHAIRMAN: He doesn't know about  
6       that.

7                   MR. B. CAMPBELL: Mr. Chairman, that is  
8       not what he said. No, that is not precisely what he  
9       said. I don't think you can put words in his mouth.

10                  MR. FEDORSEN: Q. I'm really interested  
11       in the next sentence here where you say there's no  
12       significant evidence of damage to plants or crops below  
13       about 40 parts per million. What is the evidence of  
14       significant damage to plants to exposures in excess of  
15       40 parts per million?

16                  MR. JOHANSEN: A. I believe that  
17       particular level was derived from the investigations  
18       conducted by or for the U.S. National Air Pollution  
19       Control Administration, which was, if I recall  
20       correctly, the precursor of the U.S. Environmental  
21       Protection Agency, based on a number of incidents  
22       involving H(2)S.

23                  Q. I missed the last word, sir.

24                  A. Incidents, H(2)S incidents, major  
25       releases, as well as chronic and natural.



1 Q. So, what you are saying, reading  
2 between the lines without getting into detail, because  
3 no one expects you to remember these studies, what you  
4 are saying, as I take it, is that there is evidence for  
5 some significant plant damage in exposures of over 40  
6 parts per million.

7 A. That's what I would conclude from  
8 this.

9 Q. Okay. And I wonder if as a scientist  
10 you could tell us if there is evidence that crops or  
11 plants are damaged in a significant way with exposures  
12 of plus 40 parts per million, is there some reason why  
13 we wouldn't want to be very, very careful that people  
14 aren't also damaged at exposures over 40 parts per  
15 million? Is there any correlation there that should  
16 lead us to scrutinize all this hydrogen sulphide  
17 business?

18 A. Well, again, I have not carried out  
19 any detailed study of the impact of H(2)S on vegetation  
20 or crops. I can only observe that amongst the many air  
21 contaminants that are regulated by the Ministry of the  
22 Environment there are air quality criteria for some of  
23 those contaminants which are based on the fact that  
24 certain plants are more sensitive to air contaminants  
25 than human beings.

1 Q. And we have already established,  
2 haven't we, from your own report, that certain human  
3 beings are more sensitive than others to hydrogen  
4 sulphide emissions? That was one of the three factors  
5 that your own 1984 report talked about, is that right?

6 A. Well, I think I made an observation  
7 that that was a reasonable statement.

8 Q. I tell you, again, in this spirit of  
9 open debate, I'm just trying to find out as a lay  
10 person, I don't have a deep scientific background, but  
11 am I right to worry as a human being if I see plants  
12 being damaged at 40 parts per million? Is that  
13 something that's common sense or is there a scientific  
14 reason that, no, no, don't worry about that?

15 A. Well, again, I would say that if  
16 there is clear evidence of major damage to any  
17 component of the environment, such as vegetation, that  
18 it would be a bell-wether of perhaps other effects and  
19 that should cause an investigation into what other  
20 effects might be associated with that. But I am  
21 certainly not aware of any such evidence.

22 Q. What such evidence?

23 A. Of significant damage to plants or  
24 crops.

25 Q. But your own evidence said that there

1 was none under 40. And I asked you if there could be  
2 evidence over 40, and I thought you told us there could  
3 be.

4 A. Oh, I misunderstood your point, then.  
5 I would take it from this finding of the U.S. NAPKA  
6 organization that there might be. And that's all we  
7 presented here, that this is the level at which there  
8 might be effects on plants and crops.

9 Q. Just to summarize, and conscious of  
10 the Chairman's caution to me, I don't want to put words  
11 in your mouth, am I right to say this at some stage  
12 when we get to make submission, that what you are  
13 saying is that if there is a correlation between damage  
14 to plants at above 40 parts per million, there should  
15 be investigations to make sure that people are all  
16 right at that sort of a level; is that fair?

17 A. That seems reasonable to me.

18 Q. Reasonable, yes. Thank you, sir.

19 MR. B. CAMPBELL: Just before we go on,  
20 my friend keeps referring to a 1984 report, which I  
21 took to be the report attached to interrogatory 9.21.1?

22 MR. FEDORSEN: Yes.

23 MR. B. CAMPBELL: My copy is dated  
24 December, '88. So I'm not sure whether I'm referring  
25 to the -- if I have got the right one or the wrong one.

1 MR. FEDORSEN: Ours is '84, Mr. Campbell.

2 That's why I put the date to him. I'm not sure.

3 MR. B. CAMPBELL: I know you suggested  
4 that date. I don't know. If it's going to be referred  
5 to regularly, it just seemed to me that in this spirit  
6 of openness, we better make sure that we are all  
7 referring to the same date.

8 MR. FEDORSEN: Could I just have your  
9 indulgence, please? I will show you what I'm looking  
10 at. I'm looking for the members of the panel. I'm  
11 looking at reactor safety operations, analyst section,  
12 June of '84.

13 MR. B. CAMPBELL: I think we are  
14 referring to two different reports. I started looking  
15 at the one by the interrogatory reference you gave me,  
16 and it's a later date.

17 MR. FEDORSEN: I don't think a lot is  
18 going to turn on it. We are just interested in what  
19 effects can happen at certain levels. I don't really  
20 care about the dates. Unless my friend wants to make  
21 an issue of it, I'll try to find out more precisely if  
22 I might.

23 THE CHAIRMAN: Except that you have made  
24 a point of the development of the science so on.

25 MR. FEDORSEN: I thought the witness, if

1 I was out by four years, would disagree. But if I'm  
2 wrong, I'm wrong. I stand corrected. -

3 MR. JOHANSEN: Well, my memory lapsed, I  
4 guess. The document that I referred to was the '88  
5 document.

6 MR. FEDORSEN: I stand corrected if I  
7 have inadvertently misled.

8 Q. I want to go on to something else.  
9 - You talked, in your evidence in chief, about the  
10 monitoring system to, I guess, try to make sure that  
11 levels of hydrogen sulphide around nuclear plants are  
12 at acceptable and healthy levels. Your evidence in  
13 that regard, sir, I think would have been at around  
14 21321.

15 Now, what you told us was that the  
16 Ministry of the Environment gave us a 20 parts per  
17 billion level. In effect, that was monitored hourly or  
18 half hourly; right?

19 MR. JOHANSEN: A. Two criteria, one  
20 being for ambient air, the other for ground level or  
21 other points of impingement.

22 Q. And you had indicated in your  
23 evidence in chief that that criteria, there are two of  
24 them, you said was many times lower than levels which  
25 we understand are required to cause death or serious



1 health effects. And I took it from evidence, putting  
2 the graph together, that you are talking about 100  
3 parts per million exposure?

4 A. No, I believe I was referring to the  
5 500 ppm plus range.

6 Q. You went on in 21322 to talk about  
7 the fact that continuous monitoring over the years has  
8 shown that both hydrogen sulphide and sulphur dioxide  
9 concentrations are generally very low, well below the  
10 regulatory criteria or ambient air quality. The  
11 impression I got was that everything is great because  
12 20 parts per billion is something like the effect you  
13 would get with hydrogen sulphide if you boiled an egg,  
14 put it in a plastic bag and let it sit and breathed  
15 into it. That's the sort of level of hydrogen sulphide  
16 you would get for the 20 parts per billion; is that  
17 fair? Do you know what I'm talking about?

18 A. Yes, I believe I understand your  
19 point. I certainly, if the tone of my evidence was  
20 frivolous, that wasn't intended.

21 Q. No, I don't think it was frivolous.

22 A. It makes serious reference to a  
23 regulatory criterion which I'm not sure if I explained  
24 it in the direct evidence but I believe I've referred  
25 to it since, a criterion which is based on odour



1 perception.

2 Q. Okay. Basically, the 20 part per  
3 billion regulatory standard is something like the egg  
4 analogy I gave you. It's something that there is no  
5 real scientific evidence that a 20 part per billion  
6 level would hurt anybody. We would all agree on that,  
7 I think.

8 A. That's my general understanding.

9 Q. So if, in fact, the monitors mean  
10 what they say and if we are reading things right,  
11 assuming all of the things are equal and there's enough  
12 of them and they are positioned properly and we look at  
13 the readings all the time, as long as the readings  
14 don't go above 20 parts per billion, we don't really  
15 have a concern at any Hydro plant with this flare-off  
16 process. I think everyone would agree, and would you,  
17 as well, Mr. Johansen?

18 A. That was the basis of my statement,  
19 yes.

20 Q. Now, you have heard your counsel talk  
21 about people on this panel not having the expertise to  
22 critically analyze a report on the monitors that was  
23 done by a Professor Lumbley out of Cornell University.  
24 Did you know what your counsel was talking about when  
25 he referenced that report?

1 A. Yes, I did.

2 Q. And I am certainly not going to get  
3 into detailed questions about monitors and mathematics  
4 of plumes and so on because we do expect Professor  
5 Lumbley to give evidence before this Board.

6 [4:40 p.m.]

7 But just on a very high school arithmetic  
8 kind of analysis, as I understood Lumbley, what he ends  
9 up saying in part is that because those Ministry of  
10 Environment and Hydro monitors take in air over a 260  
11 second interval that we don't have an idea of what the  
12 concentrations of hydrogen sulphide are in short time  
13 periods, for instance, one or two or three or four  
14 seconds.

15 Do you know what I am talking about,  
16 first of all?

17 A. Yes.

18 Q. Okay. In fact, when we look at the  
19 monitor readings and they tell us that levels are safe  
20 at 20 parts per billion, because that is an average the  
21 readings could be as high as one to four parts per  
22 billion -- sorry, per million, if the monitor reads 20  
23 parts per billion, and that reading of one to four  
24 parts per million could occur over a one to two second  
25 interval; would you agree?

1 THE CHAIRMAN: Do you agree that is what  
2 Dr. Lumbley says? Is that what --

3 MR. FEDORSEN: Yes, and Hydro's got a --  
4 that is why we filed tab 16, Mr. Chairman.

5 THE CHAIRMAN: Well, okay. I just want  
6 to make sure Mr. Johansen knows. He is being asked if  
7 he agrees whether that is the conclusion of Dr.  
8 Lumbley; is that correct?

9 MR. FEDORSEN: Q. Before you answer,  
10 just to be a little fairer to you, sir, if you look at  
11 tab 16, look at page 2 --

12 THE CHAIRMAN: Did you say tab 16?

13 MR. FEDORSEN: Tab, yes, 16. This is a  
14 letter to Dr. Misra.

15 THE CHAIRMAN: I am looking for Dr.  
16 Lumbley's -- oh, it is a memo about Lumbley? So this  
17 is somebody else commenting on Dr. Lumbley; is that  
18 right?

19 MR. FEDORSEN: Yes. This is from the  
20 Ministry of the Environment. Hydro has had this  
21 document.

22 Q. And the conclusion is just what I put  
23 to you, Mr. Johansen, in the middle of page 2, one to  
24 four parts per million for a one to two second average  
25 in time is what those monitors could mean when we look

1 at them that way, and none of us are -- or at least, I  
2 am not a mathematician, but you agree with that?

3 THE CHAIRMAN: Wait a minute. We want to  
4 be careful. I want get to it in stages. The first  
5 stage is whether he agrees that is what has been said,  
6 and the second stage is whether he agrees with the  
7 conclusion or not. Those are two separate questions.

8 MR. JOHANSEN: I am aware that that is a  
9 finding of Dr. Lumbley. I am not in a position to  
10 agree with the numbers, the one to four ppm and one to  
11 two second duration, but--

12 MR. FEDORSEN: Q. That's fair.

13 MR. JOHANSEN: A. --the concept of  
14 peaking within an average being period is understood to  
15 be a part of the averaging process.

16 Q. You can't agree because I guess you  
17 haven't ripped the monitors apart and done the  
18 analysis. But you are not going to disagree -- that is  
19 why I gave you this tab 16, to show you somebody else  
20 checked it and it looks fairly accurate. You are not  
21 going to disagree with that thesis?

22 THE CHAIRMAN: Well, I thought he said he  
23 disagreed with it. I thought that was the answer he  
24 gave.

25 MR. FEDORSEN: I didn't think so, Mr.

1 Chairman.

2 MR. JOHANSEN: Well, to clarify if there  
3 was any confusion, I agree that within a given  
4 averaging period there may be some peak. That is the  
5 -purpose of an averaging period, is to come up with some  
6 value which is representative of that averaging period.

7 But I'm not in a position to agree that  
8 one to four ppm specifically as proposed over a period  
9 of one to two seconds is plausible.

10 MR. FEDORSEN: Q. That is exactly how I  
11 understood your evidence, and then the Chairman  
12 indicated that he thought you said you disagreed.

13 My question is: You don't agree, but you  
14 are not in a position to disagree with those numbers?  
15 It could be right. You just don't know. You haven't  
16 done the calculations yourself.

17 MR. JOHANSEN: A. I don't know. I  
18 haven't done the calculations. I am relying on the  
19 process which has been started to resolve this issue,  
20 involving expert review within Ontario Hydro, the  
21 Ministry, the AECB, and so on.

22 Q. Okay. You are an expert in your own  
23 right on certain areas, and you are used to being asked  
24 hypothetical questions, aren't you?

25 A. Yes, I certainly am.

1 Q. Hypothetically, if you would, sir,  
2 grant me that I am right on my one to four parts per  
3 million over one to two seconds, assume I am right for  
4 the minute for the purposes of the debate.

5 The monitor, unless we are mathematicians  
6 or scientists, doesn't really tell us the peak  
7 readings?

8 A. Not directly.

9 Q. All right. And I did some  
10 kindergarten mathematics here, I got myself hopelessly  
11 confused, but I found - I think this is right - that  
12 the difference between 200 parts per billion and 4  
13 parts per million - did I say 200; getting tired - 20  
14 parts per billion and 4 parts per million is a  
15 difference of a factor of 200. Multiply 20 parts per  
16 billion times 200 and that is the inaccuracy if we look  
17 at those monitor readings literally; agreed, Mr.  
18 Johansen?

19 A. Well, I agree with your mathematics  
20 that --

21 Q. Assume the hypothetical, and this  
22 Board maybe will look at the evidence of Dr. Lumbley to  
23 see if he's right, but I am trying to give you a chance  
24 to respond to maybe some of the evidence that this  
25 Board is going to hear in the future.



1 Now, so we got a differential from a  
2 literal reading of a factor of about 200 times. We  
3 have already established through your evidence that  
4 there is a fair bit of debate amongst scientists  
5 conversant with the toxicity of hydrogen sulphide in  
6 terms of what levels affect what, what levels can  
7 affect developing organisms, went all through that  
8 earlier, right, the debate?

9 A. The record will speak for itself.

10 MR. FEDORSEN: My friend wants to say  
11 something.

12 Mr. Campbell, I'm sorry, did you have  
13 something to say?

14 MR. B. CAMPBELL: I am quite happy with  
15 Mr. Johansen pointing out that the record speaks for  
16 itself, and I would just say that I don't recall any  
17 such thing having been established. But the question  
18 having been answered I will just subside.

19 MR. FEDORSEN: Q. Let's get it right,  
20 then.

21 Mr. Campbell thinks maybe I am misleading  
22 you or maybe putting words in your mouth. Am I right  
23 or wrong that scientists conversant from your  
24 experience, relying as Hydro does on scientists in the  
25 field, that they are debating, these experts are

1 debating regarding what levels of hydrogen sulphide can  
2 affect, and the question I put to you earlier was,  
3 developing organisms? That is the subject of debate,  
4 isn't it, Mr. Johansen?

5 MR. JOHANSEN: A. Well, I can't comment  
6 on the extent to which it is the subject of debate. It  
7 is not surprising to me that that would be one issue of  
8 debate, and you have pointed me to one article that  
9 referred to it very specifically. So I think that was  
10 about the extent of our discussion on it earlier.

11 Q. Well, I asked you about whether you  
12 could definitively tell us whether 10 parts per million  
13 in exposures of one to four seconds could be  
14 detrimental to developing organisms. I thought your  
15 answer was you really don't know.

16 MR. B. CAMPBELL: His answer was that he  
17 had no basis on which to express an opinion, as has  
18 been his answer consistently throughout that, and, Mr.  
19 Chairman, I think it is quite unfair to characterize  
20 that answer as illustrating that there is a debate in  
21 the scientific community.

22 MR. FEDORSEN: Well, I think we are  
23 mincing words.

24 THE CHAIRMAN: I think it is getting to  
25 be argumentative.

1                   Just because Mr. Johansen says he doesn't  
2           have an opinion one way or the other about a certain  
3           result, it does not follow from that that there is a  
4           debate in the scientific community about it. I suppose  
5           there is discussion in the scientific community about  
6           almost every subject that there is, and I hope there is  
7           continuing discussion. That is the way we gain more  
8           knowledge, as you point out earlier.

9                   But whether there is a recognized  
10          difference of opinion in the scientific community with  
11          respect to this, that may be established later, but it  
12          hasn't been established so far.

13                   MR. FEDORSEN: Maybe I can do it this  
14          way, Mr. Chairman, and I will leave this point after  
15          this question.

16                   Q. Let me put it to you this way, Mr.  
17          Johansen.

18                   Maybe there is no debate, maybe the  
19          consensus is amongst renowned scientists in the field  
20          of hydrogen sulphide that they are not going to  
21          recommend developing organisms going into hydrogen  
22          sulphide concentrations for even one to four seconds if  
23          those concentrations are even 10 parts per million; is  
24          that fair? Could be.

25                   THE CHAIRMAN: Well, I don't know what

1 use that question is to anybody.

2 MR. FEDORSEN: Well, Mr. Chairman, I  
3 think it is highly useful because --

4 THE CHAIRMAN: Well, Mr. Johansen has  
5 been asked these questions, and I think he has tried to  
6 answer them as well as he can, and I think you have  
7 just got to go on to something else.

8 MR. FEDORSEN: I will do that.

9 Q. Let me get back to this --

10 THE CHAIRMAN: You can pursue this line  
11 of monitoring, which is something that I think Mr.  
12 Johansen can help you on a bit and he has been trying  
13 to do that.

14 But the basic position of Hydro seems to  
15 be that they are staying within the standards. The  
16 standards are being established by people who they have  
17 confidence in. I take it that is the sum and substance  
18 of Hydro's position.

19 Whether that is right or wrong, whether  
20 they should be doing something else, that may be a  
21 matter for debate.

22 MR. FEDORSEN: Q. We do agree that if we  
23 use the hypothetical of Lumbley's analysis saying there  
24 are peak concentrations of one to four parts per  
25 million that a literal reading of the monitor is out by

1 a magnitude of 200; right?

2 MR. JOHANSEN: A. Well, using the two  
3 numbers that you put to me, that is the difference.

4 Q. We also agree that if you  
5 underestimate readings by a magnitude of even a third,  
6 three to one, you are going to get a lot different  
7 health consequences at readings of 100 parts per  
8 million versus 300 parts per million of hydrogen  
9 sulphide?

10 A. In the hypothetical.

11 Q. Okay. Now, when did Hydro appreciate  
12 that the peak readings of say one to four parts per  
13 million, if you will accept the hypothetical that I  
14 gave you -- did Hydro always know that those monitors  
15 could have peak values of one to four parts per million  
16 or did you find out --

17 THE CHAIRMAN: No, no. Wait a minute.

18 You can accept a hypothetical for the  
19 purpose of another question, but he has never accepted  
20 that there was the one to four peak. He says they are  
21 a peak, he doesn't know what it may be, and I take it  
22 he has always known that there is a peak when you do an  
23 averaging, that every measurement is not uniform over a  
24 period of time.

25 MR. FEDORSEN: If we could turn, then,

1 Mr. --

2 THE CHAIRMAN: But he never accepted that  
3 one to four was the peak amount. At least, I didn't  
4 hear him accept it, and if he did I stand to be  
5 corrected.

6 MR. FEDORSEN: No, you didn't, but --

7 MR. JOHANSEN: I certainly did not.

8 MR. FEDORSEN: Q. If you go to tab 42,  
9 sir, this is an interrogatory asking for some  
10 description of the monitors, and this interrogatory  
11 asked the question --

12 THE CHAIRMAN: By the way, this is  
13 Interrogatory 9.21.139?

14 MR. FEDORSEN: Yes, it is, sir.

15 THE REGISTRAR: That is given number of  
16 .169.

17 THE CHAIRMAN: Thank you.

18 ---EXHIBIT NO. 520.169: Interrogatory No. 9.21.139.

19 MR. FEDORSEN: Q. Just to give the Board  
20 some context because you have been referring, Mr.  
21 Johansen, to this ongoing investigation, you called it,  
22 into these monitors.

23 This question was put to Hydro after we  
24 had received the Lumbley report; that was a preliminary  
25 report prepared by Lumbley to find out what those --



1       whether those monitors were accurate or not.

2                   Hydro's response was this, on page -- if  
3       you go into the interrogatory, Hydro -- this is -- the  
4       second from the bottom line there:

5                   Hydro is in general agreement with  
6                   most of Professor's Lumbley's report and  
7                   this report was not a revelation to  
8                   Hydro.

9                   Now, someone from Hydro prepared that  
10       response. I would have thought that given the fact  
11       that the statement of concerns was given I think back  
12       in January, given the fact that Hydro has had Lumbley's  
13       report, you could have assisted now with whether Hydro  
14       agrees given all this time with what the Ministry of  
15       the Environment seems to agree with one to four parts  
16       per million over one to two seconds.

17                   MR. B. CAMPBELL: Where is that?

18                   THE CHAIRMAN: It is in -- where is that,  
19       the Ministry's letter?

20                   MR. FEDORSEN: That would have been  
21       tab...I think it was 16.

22                   THE CHAIRMAN: 16?

23                   MR. FEDORSEN: Yes. Yes, it was 16, sir.

24                   MR. JOHANSEN: Did you put a question to  
25       me, Mr. Fedorsen?

1 MR. FEDORSEN: Q. I am going to now.

2 Just the Chairman asked for tab 16.

3 What does that interrogatory mean, that  
4 the Lumbley report is no revelation to Hydro and you  
5 are in general agreement with most of it? What does it  
6 mean? Or don't you know?

7 MR. JOHANSEN: A. Well, I didn't prepare  
8 the response, so -- and I must confess I didn't seek  
9 clarification as to exactly what that would have meant.  
10 If I were responding to this I guess I would repeat  
11 what I said to you earlier, that certainly there is a  
12 general appreciation of the peaking nature of  
13 emissions, and that I can't really speculate on what  
14 was intended there, but I observed that this was a  
15 preliminary review of a preliminary study by Dr.  
16 Lumbley, and it seems to me that what should be focused  
17 on is the final report and the final review of that  
18 report.

19 Q. And hopefully we will hear from  
20 Lumbley. But you won't give me my point that I could  
21 be right on one to four parts per million.

22 Let's assume I am, though. I think we  
23 are going to prove that at some stage, and maybe Hydro  
24 would even give that concession if they had read these  
25 reports so we don't have to debate this all afternoon

1 on a point that is out of --

2 MR. B. CAMPBELL: Mr. Chairman, we have  
3 answered hundreds and hundreds of interrogatories on  
4 this point. I don't recall being asked an  
5 interrogatory for the one to four.

6 The report that has been prepared by  
7 Hydro's Research Division dealing with these monitors  
8 is part of this package, and it gives Hydro's best  
9 scientific view of the monitors issue. I don't know  
10 what more my friend can expect.

11 MR. FEDORSEN: Fine. I just thought we  
12 would get the concession, but they don't know the  
13 answer so I will live with it.

14 Q. If we go to tab 2, assume, sir, Mr.  
15 Johansen, that I am correct, that mathematicians would  
16 agree that the structure of those monitors give us  
17 readings of peak concentrations of one to four parts  
18 per million over one to two seconds. Make that  
19 assumption as a scientist.

20 If you look at this letter of November  
21 8th, this is from a Mr. Page. I guess he is from  
22 Hydro.

23 MR. JOHANSEN: A. He is with the  
24 Ministry of the Environment.

25 Q. Ministry of Environment. These are

1 the people you are relying on for your standards; is  
2 that right?

3 A. Yes. They set the standard.

4 Q. If I am right about my numbers, when  
5 you read the paragraph -- this is one, two, three down,  
6 and we will read this line, starting:

7 The concentration of hydrogen sulfide  
8 was not greater than the provincial air  
9 quality standard of 20 parts per billion  
10 averaged over half an hour.

11 Then there is a line with a short peak concentration of  
12 25 parts per billion.

13 If I am right on my numbers would this be  
14 a misleading letter? Because really the short peak  
15 concentrations could be many, many, many times higher,  
16 in the range of 200 times higher than what they are  
17 saying there; am I right on that?

18 A. Well, I certainly can't comment on  
19 what might have been intended by the statement from the  
20 Ministry of the Environment.

21 Q. Fair enough, sir. I appreciate that.

22 THE CHAIRMAN: Well, would this mean, Mr.  
23 Johansen, that if the assumption that 1.4 is right you  
24 would then be meeting the ministerial standards, given  
25 the average figures and so on?

1 MR. JOHANSEN: If the average were 20  
2 ppb, Mr. Chairman, yes, we would.

3 THE CHAIRMAN: Notwithstanding that it  
4 had this high peak?

5 MR. JOHANSEN: Yes. The requirement is  
6 to meet the air quality criteria in order of ground  
7 level or other point of impingement concentration  
8 limits over their respective averaging periods.

9 MR. FEDORSEN: Q. I understand.

10 MR. JOHANSEN: A. And there is no limit  
11 on the instantaneous peaks that may occur within that  
12 averaging period.

13 Q. I understand that, sir. I am just  
14 looking at it from a sort of lay point of view here to  
15 find out if we are getting the kind of open debate with  
16 the public that everybody here wants.  
17 [5:00 p.m.]

18 If we look at tab 6, this is a letter it  
19 looks like to Mr. Kerrio, the Honourable Vincent  
20 Kerrio, the Ministry of Energy and Natural Resources  
21 1986, and that looks like it's from Hydro this time,  
22 not the Ministry.

23 Is he the chairman of Hydro -- was then?

24 A. He was then, yes.

25 Q. And I guess he is not responsible for



1 what he writes because he is going to have people tell  
2 him, advise him and he follows his advice, generally  
3 speaking.

4 THE CHAIRMAN: I don't think you need to  
5 editorialize, Mr. Fedorsen.

6 MR. FEDORSEN: Fair enough.

7 Q. We go to paragraph 3 of his letter, I  
8 am referencing what the chairman of Hydro tells the  
9 Minister of Energy and Natural resources in the letter.  
10 He says that on that day - this is with respect to an  
11 '85 problem that we will get into later on - that the  
12 monitor located adjacent to Mr. Bourgeois' property  
13 recorded a peak hydrogen sulphide concentration of 25  
14 parts per billion. You would agree that is a little  
15 misleading; isn't it?

16 MR. JOHANSEN: A. Well, I don't know.  
17 On what basis do you say it's misleading?

18 Q. On the basis of my hypothetical.

19 THE CHAIRMAN: I don't understand you.  
20 I'm sorry, I don't understand that. It's only  
21 misleading if you are right in your hypothetical.

22 MR. FEDORSEN: And evidence may disclose  
23 I am.

24 THE CHAIRMAN: You can't say it's  
25 misleading if the person who writes the letter doesn't



1 have the same data that you are proceeding form.

2 MR. FEDORSEN: I one hundred per cent  
3 agree with you and that's the point I am trying to  
4 make.

5 THE CHAIRMAN: I don't think it's fair to  
6 characterize the statement as being misleading.

7 MR. FEDORSEN: I one hundred per cent  
8 agree with you.

9 What I am trying to get at, for the  
10 members of the Board, is, I want to know, and no one  
11 seems to want to tell me, when it is that Hydro knows  
12 that we can have peak concentrations maybe in the range  
13 I am suggesting.

14 I look at their interrogatory, they say  
15 the report is no revelation. I see the chairman  
16 writing something that if evidence discloses I am  
17 right, appears to be, and I am not ascribing fault, it  
18 looks like either Hydro doesn't understand the monitors  
19 or at least the chairman was improperly advised. And  
20 this is, after all, going to the Minister. That's the  
21 only point I am trying to make.

22 I am in total agreement with your point  
23 there, Mr. Chairman. They can't have it both ways.

24 THE CHAIRMAN: But the evidence is that -  
25 and let me hasten to say that that may not be good

1 enough - but the evidence is that even granted your  
2 assumption, they consider that they are still within  
3 the regulations laid down by Ministry.

4 MR. FEDORSEN: Q. I agree, except for  
5 this, somebody is being told that the maximum peak  
6 concentration is 25 parts per billion, and it goes on  
7 and says - if I can address this to Mr. Johansen - the  
8 concentration is enough to create odour, but it's 2,000  
9 times lower than that requiring possible activation of  
10 the off-site alarm.

11 The fact is, Mr. Johansen, if this Board  
12 gets mathematical evidence to indicate that I am right  
13 about the peaks, would you agree that this level here  
14 where the Minister, perhaps ill-informed, says it can  
15 create odour, was a lot higher than that which is  
16 necessary to create odour. 150 parts per million  
17 create odour. This could be a peak reading of 1 to 4  
18 parts per million.

19 MR. B. CAMPBELL: Mr. Chairman, I don't  
20 even understand where we are in this question. My  
21 friend is putting this forward on some basis that I  
22 don't understand.

23 All this letter says is that the monitor  
24 recorded certain information. It's the Ministry of the  
25 Environment monitor, we obtained the information from

1 the Ministry of the Environment. It simply states what  
2 the monitor recorded. The monitor records lower values  
3 and it records higher values. This is the peak value  
4 that it recorded. That's all that's being said.

5 There is absolutely nothing misleading  
6 about it. I don't understand my friend's question and  
7 I think he ought to at least deal with things fairly.

8 MR. FEDORSEN: I am trying to. Let me  
9 rephrase it.

10 Q. If you read both sentences in  
11 context, if I am right in my hypothetical, the comment  
12 that the concentration is enough to create odour is  
13 incorrect insofar as it could have been a lot more than  
14 is necessary to create odour; it could have been at the  
15 level of 1 to 4 parts per million if this Board gets  
16 the evidence I say we can produce.

17 MR. JOHANSEN: A. Well, it seems to me I  
18 have answered basically that question. But again, in  
19 the hypothetical, using your numbers, that could be so.

20 I wonder, though, if the word "peak" in  
21 this context is intended to mean the same as "peak" in  
22 the context of a more detailed or technical analysis of  
23 the issue.

24 MS. PATTERSON: Mr. Fedorsen, without  
25 dealing with your hypothetical, are you trying to say

1 that in this letter under tab 6, that the concentration  
2 of 25 parts per billion, because the author says that  
3 could create odour, that is a lot smaller concentration  
4 than what the chart behind tab 58 says, which is .15  
5 parts per million.

6 MR. FEDORSEN: Actually, what I am trying  
7 to say is this: When you look at the sequence of these  
8 letters, it sure does look to at least a lay observer -  
9 and I will be making this point in submissions - that  
10 Hydro doesn't appreciate back in '86 the problem of  
11 peak readings. They hadn't broken this down because  
12 the only study that was ever made was when my client  
13 requested Lumbley to do it, and then we asked the  
14 interrogatory off of it.

15 I could make a different point if I could  
16 get an answer to the question of what it is that they  
17 agreed with in Lumbley's interim report, what it is  
18 they disagreed with, and what it was that wasn't a  
19 revelation, but I can't get that answer.

20 MS. PATTERSON: Maybe you should get an  
21 undertaking about what they meant about Lumbley's  
22 report and then we could go on.

23 THE CHAIRMAN: First of all, one of the  
24 reasons you haven't got the answer is you haven't asked  
25 that question yet.

1                   One of the things they do not agree with,  
2   and that is that they do not agree with the 1 to 4 peak  
3   reading. I think that's one thing that they have said  
4   they don't agree with. But other than that, and that  
5   may be the only thing you are concerned about, I don't  
6   know.

7                   MR. FEDORSEN: I am going to take the  
8   advice I was just given and ask for the undertaking. I  
9   am not going to beat this to death.

10                  THE CHAIRMAN: In order to get the  
11   undertaking, you have to ask the question first.

12                  MR. FEDORSEN: First of all, I am at  
13   cross purposes with you, Mr. Chairman, on the reading  
14   of the evidence. I am not sure that they either agree  
15   or disagree with Lumbley. I don't think they --

16                  THE CHAIRMAN: They do not accept the 1  
17   to 4 peak reading within the time period, they do not  
18   accept that. I think they have said that. There is  
19   the peak and it is not a uniform experience over the  
20   260 seconds, there is peaks and valleys during that  
21   time, and they don't know what the peak is. That's  
22   what they have said. And maybe they should, I don't  
23   know whether they should or shouldn't, but they don't  
24   know that.

25                  MR. FEDORSEN: Okay. Let me ask these



1 questions and see if I can get the undertaking.

2 THE CHAIRMAN: So they can't accept that  
3 part of Lumbley's report, I think it must follow from  
4 that. I haven't read Lumbley's report, but if he says  
5 that, then they can't accept that.

6 MR. FEDORSEN: Maybe it will become clear  
7 when we get Mr. Lumbley and we will read the evidence  
8 back on submissions.

9 Q. Let me ask you this, Mr. Johansen,  
10 was there ever any breakdown to your knowledge of what  
11 the monitor readings on an hourly or half hourly  
12 average would mean in terms of maximum peak  
13 concentrations over 1 to 2 seconds or over 5 to 10  
14 seconds or whatever peaks you would have researched at  
15 Hydro? Did Hydro do any analysis of that?

16 MR. JOHANSEN: A. I believe somewhere in  
17 the many interrogatory responses there was some  
18 response which touched on that.

19 I believe the general expectation as to  
20 whether the average reading adequately represented the  
21 quality of the air that it was sampling, the indication  
22 I believe was that the uncertainty range was something  
23 like plus or minus 50 per cent.

24 Q. Fifty per cent in terms of what?

25 A. The reliability of the monitoring



1 equipment.

2 Q. My question, sir, I'm sorry, but we  
3 are running late here. I am asking you about peak  
4 concentrations. Did Hydro do a study so that they  
5 would have known peak concentration readings from  
6 hourly averages or half hourly averages which is what  
7 the monitors read, did they do such a study?

8 A. I'm aware of information reported I  
9 think in the annual environmental summary documents,  
10 again copies of which were provided in the  
11 interrogatory process, perhaps not to your client, I  
12 don't recall that, there were so many of them, but in  
13 those annual reports, particularly in the context of  
14 identifying cases of exceedances of the half hourly and  
15 hourly criteria, there was in general a breakdown of  
16 the average reading indicating what the peak was during  
17 that averaging period. But I am not aware that there  
18 was or has been a detailed study such as you seem to be  
19 suggesting of the general nature of peaks within that  
20 averaging period for H(2)S monitors. There may well  
21 have been, but I am not aware of it.

22 Q. First of all, if there was, subject  
23 to the ruling of this Board, could you undertake to  
24 advise us if there was and when it was?

25 A. Yes. If you wish that to be an

1       undertaking.

2                   Q.   Yes.   And, secondly, when you just  
3       told us about this study where although there wasn't a  
4       mathematical breakdown of the readings, you were able  
5       to determine what the peaks were, how could that  
6       possibly have been done?

7                   A.   Well, I am just commenting on what  
8       was reported.   I haven't seen the analysis that went  
9       into that.   But clearly someone must have estimated it.

10                  Q.   They estimated what the peak would  
11       be?

12                  A.   Yes.

13                  Q:   So if that's around you will get it  
14       for us and give it to us?

15                  A.   Perhaps we should --

16                  Q.   Subject to your counsel's comments  
17       and the Board, of course.

18                  MR. B. CAMPBELL:   Let me make sure I  
19       understand exactly what is being asked for.   Mr.  
20       Johansen has referred to an annual environmental report  
21       that the speaks to both time average and peak  
22       calculations, and what you would like is, I assume,  
23       that report and an indication of the analysis or method  
24       of arriving at the peak value; is that right?

25                  MR. FEDORSEN:   Yes, please.

1 MR. B. CAMPBELL: That is fine.

2 THE CHAIRMAN: Could we have a number for  
3 that, please?

4 THE REGISTRAR: 532.18.

5 ---UNDERTAKING NO. 532.18: Ontario Hydro undertakes to  
6 provide the annual environmental report,  
7 re time average and peak calculations,  
and an indication of the analysis or  
method of arriving at the peak value.

8 MR. FEDORSEN: My client is pointing out  
9 to me that one of the issues here is the time that they  
10 knew this, when they found this information out, we are  
11 interested in.

12 THE CHAIRMAN: That would be evident from  
13 the report itself.

14 MR. FEDORSEN: Thank you.

15 MR. B. CAMPBELL: I think so, Mr.  
16 Chairman, and I think the interrogatory 9.21.139, if my  
17 friend had gone on and read, the last paragraph makes  
18 it quite clear that Hydro's -- it's just a general  
19 knowledge of monitoring that there are time average  
20 values. It's referred to in the interrogatory. I  
21 think it is just a characteristic of any monitoring  
22 system.

23 MR. FEDORSEN: It may be. The issue is  
24 what Hydro has done to look at that, that's all. I am  
25 not saying they have been derelict in their duty; I

1 just want to know when it was done.

2 DR. CONNELL: Could I interrupt for a  
3 moment just to clarify with Mr. Johansen.

4 I would like to take you back to tab 16,  
5 to Mr. Bloxam's memorandum for a moment, Mr. Johansen.  
6 This refers to two kinds of monitoring, there was the  
7 special intervention of Mr. DeBrou which involved TAGA,  
8 which I believe to be a form of mass spectrometric  
9 analysis, and which can be done on a very short  
10 sampling time, and it compares that with what is  
11 referred to as TRS, on page 2.

12 TRS, that is a reference to the normal  
13 monitoring system which is in place; is that correct?

14 MR. JOHANSEN: Yes, it is, Dr. Connell.

15 DR. CONNELL: TRS refers to the --

16 MR. JOHANSEN: Total reduced sulphur is  
17 the acronym.

18 DR. CONNELL: And that is done by  
19 conversion to S(O)2 --

20 MR. JOHANSEN: Yes, indeed.

21 DR. CONNELL: I would just like you to  
22 confirm my understanding, but I can't find anywhere in  
23 this memorandum a reference to the specific values  
24 which Mr. Bloxam or Mr. DeBrou reported. I see a  
25 reference to a ratio of 10 to 1 on the bottom line of

1 the first page, and in line 3 and 4 of the second page  
2 a reference to ratios of peak to average of 3 to 50.

3 He at no point observed a ratio as high  
4 as 100 to 1 that he postulates in the next paragraph,  
5 and he hasn't cited any specific value that Mr. DeBrou  
6 found. The value of the 9 parts per billion is one  
7 that he is citing from the TRS measurements, not from  
8 his own. Is that your reading?

9 MR. JOHANSEN: That's my reading, yes.

10 DR. CONNELL: So we can't derive from  
11 this memorandum any insight as to the values that were  
12 found by TAGA.

13 MR. JOHANSEN: Not in absolute terms, no.

14 DR. CONNELL: Just the ratios?

15 MR. JOHANSEN: Yes.

16 DR. CONNELL: Thank you.

17 MR. FEDORSEN: Q. Just if I might, Mr.  
18 Johansen, following along the hypothetical.

19 Assume Lumbley is right with the peak  
20 concentration, does that mean that if I have a monitor  
21 reading of 10 parts per million, that I could be  
22 subjected to a short duration exposure over 1 to 2  
23 seconds in the range of 1,000 to 2,000 parts per  
24 million? Is my math right on that?

25 MR. JOHANSEN: A. You are reading 10

1 parts per million?

2 Q. Yes, sir.

3 A. And you are using the same arithmetic  
4 that you put to me before?

5 Q. Yes, sir.

6 A. The ratio between the 20 parts per  
7 billion and the 4 ppm at the upper end of your  
8 hypothetical range then, the factor would be 200 and  
9 the product of that and the hypothetical 10 ppm would  
10 be 2,000 ppm. That's the math.

11 MR. FEDORSEN: At this stage I am going  
12 to renew something that I didn't really get to argue  
13 fully, Mr. Chairman. It has to do with the without  
14 prejudice letter that you didn't look at.

15 THE CHAIRMAN: You can use the data  
16 that's in the without prejudice letter on a  
17 hypothetical basis. You don't have to refer to the  
18 letter.

19 MR. FEDORSEN: That's fine. I appreciate  
20 that. That's all I want.

21 THE CHAIRMAN: It's not an admission by  
22 Ontario that those measurements are appropriate.

23 MR. FEDORSEN: Yes, one hundred per cent  
24 accurate.

25 Q. In that context, if somebody were to



1 suggest that somebody should be prepared to accept a 10  
2 part per million reading on a monitor, as we now know  
3 they are averaged, would that be healthy thing to  
4 recommend or something that would display a lack of  
5 knowledge of how those monitors really read?

6 THE CHAIRMAN: That's assuming your 1 to  
7 4 --

8 MR. FEDORSEN: Yes, sir.

9 MR. JOHANSEN: Well, I guess the answer  
10 to that --

11 THE CHAIRMAN: Dr. Connell just told me  
12 he doesn't understand the question, which is a very  
13 serious situation as far as I am concerned. (Laughter)  
14 If he doesn't understand it, nobody understands it.

15 DR. CONNELL: As long as the Chairman  
16 understands it.

17 [5:20 p.m.]

18 MR. FEDORSEN: Let me try again, Doctor.

19 Q. We just established, Mr. Johansen,  
20 that assuming the hypothetical, one to four over one to  
21 two seconds, one to four parts per million, that could  
22 mean readings for one to two seconds on one of those  
23 monitors could mean a peak reading of 1,000 to 2,000 --  
24 sorry. It could mean, one to 2,00 parts per million;  
25 and you already answered that moments ago.

1 MR. JOHANSEN: A. In the hypothetical,  
2 yes.

3 MR. B. CAMPBELL: What he said is he  
4 agrees with the mathematics. There is no admission --

5 THE CHAIRMAN: I understand that, Mr.  
6 Campbell.

7 MR. B. CAMPBELL: Mr. Chairman, and now  
8 we are going to be faced with something that is, in  
9 effect, taken right out of an offer-to-settle letter.

10 And with respect, I would like to record  
11 on the record that while the mathematics, if you  
12 multiply the two numbers together as my friend has  
13 suggested, but there has been no admission that I have  
14 heard of that says that that is appropriate given the  
15 monitoring or given the levels. I'm not at all sure  
16 that these things are linear or anything else.

17 THE CHAIRMAN: I thought I made it clear  
18 when I permitted Mr. Fedorsen to ask it that using  
19 these standards was in no way an admission by Hydro  
20 that they were appropriate or inappropriate.

21 MR. B. CAMPBELL: My friend is asking, as  
22 I understood his last question, for some kind of  
23 admission as to the reasonableness of figures, and  
24 let's not beat around the bush here, that were part of  
25 settlement discussions. And I, quite frankly, I think

1 we have strayed past the line of fairness to Ontario  
2 Hydro in dealing with this matter. And in my  
3 submission, my friend has established the mathematics  
4 of the ratio, and to go farther and deal with what can  
5 only be in relation to settlement discussions that were  
6 had, in my submission, can be of no probative value to  
7 this Board on any relevant issue before it and can  
8 potentially be damaging to my client. And in my  
9 submission, this line of questioning should not be  
10 permitted.

11 MR. FEDORSEN: It would be very simple,  
12 Mr. Chairman, if I could find out what when it is they  
13 knew about these peak readings.

14 MR. B. CAMPBELL: Mr. Chairman?

15 MR. FEDORSEN: May I finish, if I may?

16 THE CHAIRMAN: Yes. I thought their  
17 evidence was that they don't even know to this minute  
18 about what the appropriate peak reading should be.

19 MR. FEDORSEN: But I think you are going  
20 to hear evidence, and I think Hydro is going to agree,  
21 and I may be wrong, but they're going to agree with my  
22 hypothetical. They are going to disagree with Lumbley  
23 on where he's going to take that hypothetical when we  
24 hear evidence.

25 THE CHAIRMAN: Well, they haven't done it

1 yet.

2 MR. FEDORSEN: They haven't. But if I'm  
3 right, if you read the report they will. But I don't  
4 think there is going to be disagreement over my  
5 hypothetical. I stand to be corrected and chastised  
6 severely if I'm wasting time on this. I think I'm  
7 solid on this point. And all I'm now saying is --

8 THE CHAIRMAN: Well, I don't know what  
9 basis you think they're going to accept it when they  
10 have been spending the last 40 minutes trying to make  
11 it clear that they are not accepting it.

12 MR. FEDORSEN: I don't care what they  
13 accept. I want this board to have an understanding of  
14 the math so that when I bring the scientist down, you  
15 people can scrutinize these numbers. I'm not concerned  
16 if they want to disagree or agree. They have disagreed  
17 or won't agree, and I'm putting the hypotheticals to  
18 them so when you hear the evidence, if it's reliable  
19 and trustworthy, this board can make a proper  
20 consideration and determination of what is at stake  
21 here. That's all I'm driving at.

22 THE CHAIRMAN: But I understand Mr.  
23 Campbell's point. He doesn't want us to stray into the  
24 area of a dispute between Hydro and your client.

25 MR. FEDORSEN: Let me maybe direct it to

1 Dr. Whillans.

2 THE CHAIRMAN: Why don't we just leave it  
3 where we are at. You should have all that you need at  
4 this point. I don't know whether the question stands  
5 out, but if it does, then there is a very significant  
6 short-term emission.

7 MR. FEDORSEN: All right. I will leave  
8 it. And I'm wondering, is the board prepared to sit  
9 for how long? This would be a time to break if you are  
10 not prepared. I am not going to finish, I'm sorry. I  
11 will go back and pare this down and try to wind it up  
12 in an hour and maybe I can do it. I'm prepared to  
13 continue.

14 THE CHAIRMAN: We are not going to  
15 continue for an hour, so we might as well stop.  
16 Perhaps we should start -- no, we can't start at 9:30,  
17 I'm sorry, tomorrow. You'll only have, an hour and a  
18 half and we stop tomorrow morning, you understand that.

19 MR. FEDORSEN: Does that mean we go from  
20 10:00 to 11:00, then we stop and come back?

21 THE CHAIRMAN: No, it's 10:00 to 11:30.

22 MR. FEDORSEN: Then we come back at 2:00?

23 THE CHAIRMAN: At 2:00, but I hope you'll  
24 be finished by then because we have got some other  
25 people.



1 MR. FEDORSEN: So do I. I'm supposed to  
2 be in other courts, Mr. Chairman. I'll do my best. I  
3 have only got about eight pages here.

4 THE CHAIRMAN: All right. Thank you. We  
5 will adjourn until tomorrow morning at ten o'clock.

6 THE REGISTRAR: Please come to order.  
7 This hearing is adjourned until ten o'clock tomorrow  
8 morning.

9  
10 ---Whereupon the hearing was adjourned at 5:25 p.m., to  
11 be reconvened on Wednesday, May 13, 1992 at 10:00  
a.m.

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